FEBRUARY, 1957

METAL FINISHING

DEVOTED EXCLUSIVELY TO METALLIC SURFACE TREATMENTS

FOUNDED 1903

Metal Polishing with Set-Up Wheels
Practical Procedure Details

Design and Construction of a New Plating Department
A New Approach to Plant Design

Surface Treatment and Finishing of Light Metals
Zinc Immersion Processes

Finishing Pointers
Analytical Factors

Determining Iron in Chromium Plating Solutions
Rapid, Accurate Analytical Method

Science for Electroplaters
Throwing Power

Complete Contents Page 50A

READ & PASS ON

THIS BULLETIN contains the latest information concerning CLEPO Products, Processes and Services. It is compiled especially to treat with your problems in connection with cleaning in all its phases, stripping, deburring, and burnishing. Particular emphasis is given to CLEPO Products and Processes used in preparation for electroplating. Send for your copy. Study this information in relation to your specific requirements. If we can be of help do not hesitate to call on us. You can get in touch with our nearest representative whose name, address, and phone number are given in the back of this bulletin.

FREDERICK **GUMM** *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N.J.

ENTHONE
Emulsion Cleaner
75

Removes Oil and Solid Dirt in SECONDS!

SIMPLE OPERATION . . . MANY ADVANTAGES

DIP . . . steel parts to be cleaned in Emulsion Cleaner 75 for only *15 seconds.* This simple immersion is done at room temperature (no heating facilities required) and with no irritation of the operator's nose, throat or skin.

RINSE . . . in plain water.

DONE . . . and done *thoroughly* . . . in seconds! All heavy oil films and solid dirt have been removed from every corner and crevice . . . from slots, tapped holes and sculptured patterns.

INSURE . . . smoother, brighter, more adherent electrodeposits . . . and a reduction in pitting.

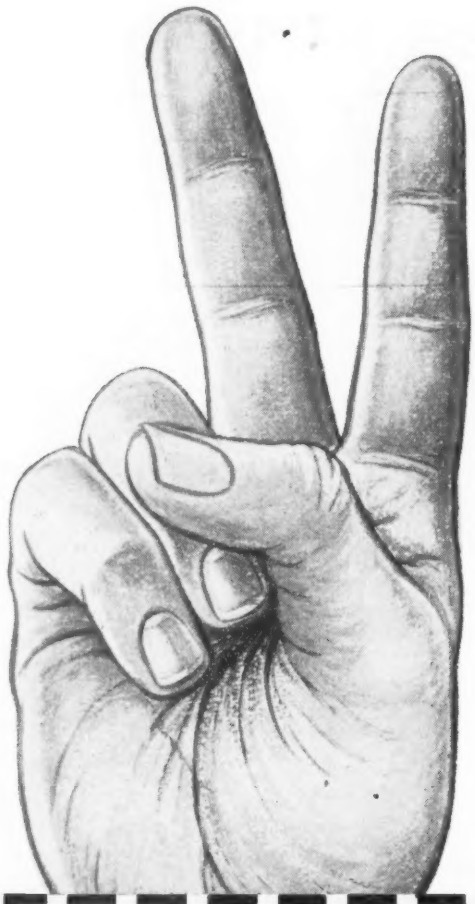
WRITE FOR FREE LITERATURE ON THIS SIMPLE, FAST, SAFE . . . AND ECONOMICAL . . . METHOD OF CLEANING METALS.

Service Representatives and Stock Points in Principal Cities of U.S.A. and Canada, Brazil, England, France, Sweden, and Germany

ENTHONE INCORPORATED

442 ELM STREET, NEW HAVEN 11, CONNECTICUT
Metal Finishing Processes • Electroplating Chemicals

HERE are TWO important advantages you get with Oakite Composition No. 98 in solvent spray washing:



1 ***Effectively cleans parts between machining operations***

2 ***Protects work against indoor rust***

OAKITE COMPOSITION No. 98—new emulsifiable solvent cleaner expressly designed for use in one and two-stage spray-washing equipment—safely removes light to moderate soils from all metals.

WHILE REMOVING THE SOIL, Oakite Composition No. 98 also gives machined parts a non-tacky film to protect them against indoor rust during temporary storage.

FOR REMOVING EXTRA HEAVY SOILS, Oakite Composition No. 98 may be used in combination with recommended Oakite alkaline detergent, using a two-stage pressure spray washer.

Read what enthusiastic users have to say about Oakite Composition No. 98. Then call your local Oakite Technical Service Representative for a demonstration of Oakite Composition No. 98. Or write for free descriptive booklet to Oakite Products, Inc., 26 Rector Street, New York 6, N. Y.

REMARKABLE RESULTS NOW OBTAINED BY ENTHUSIASTIC METAL FABRICATORS

Auto-maker washing blocks, cam shafts, tappets, wrist pins, transmission housings, fly wheels and other parts is delighted with the rust protection obtained.

Automotive plant turning out parts with highly finished surface reports use of Oakite Composition No. 98 not only cleans but also leaves a streak-free protective film so essential to quality control.

Metal fabricator finds that small precision steel parts are protected against rust for 3 to 4 weeks. The need for expensive fire prevention equipment—originally installed for use with low-flash rust-proofing oil—is eliminated.

Engine builder using Oakite Composition No. 98 in two-stage washer says not only are parts well cleaned but also protected against rust at unusually low cost.

Metal parts company washing parts by machine finds Oakite Composition No. 98 completely eliminates rusting in humid weather.

Manufacturing firm reports Oakite Composition No. 98 very economical. Parts come through clean and bright, no cloudy film—good rust protection.

Engine builder using Oakite Composition No. 98 after machining but prior to inspection and assembly expects five-day rust protection and gets it.

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS | METHODS | SERVICE
SCIENCE

Technical Service Representatives in Principal Cities of U. S. and Canada

Export Division Cable Address: Oakite

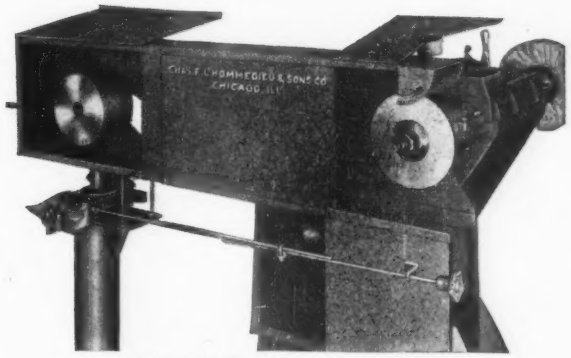
4/Circle on Readers' Service Card

Metal Finishing is published monthly by the Finishing Publications, Inc., 381 Broadway, Westwood, New Jersey, U.S.A.
Entered as second class matter at the Post Office in Westwood, N. J. Volume 55, No. 2, February, 1957. Four Dollars Per Year.

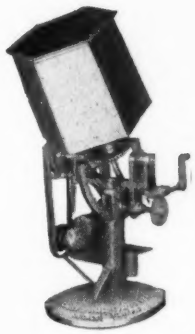
USE "RELIANCE" PRODUCTS FOR

ECONOMY : EFFICIENCY : DEPENDABILITY

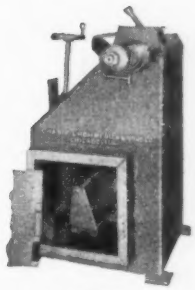
WRITE FOR FURTHER DETAILS



BACKSTAND IDLER WITH LATHE

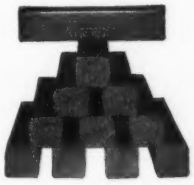


OBLIQUE
TUMBLING BARREL



#23A
POLISHING LATHE

BACKSTAND IDLER



EXTRUDED COMPOSITIONS
STANDARD SIZE
2 x 2 x 10"

NUWAY BUFFS FOR
FAST CUTTING

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Installed

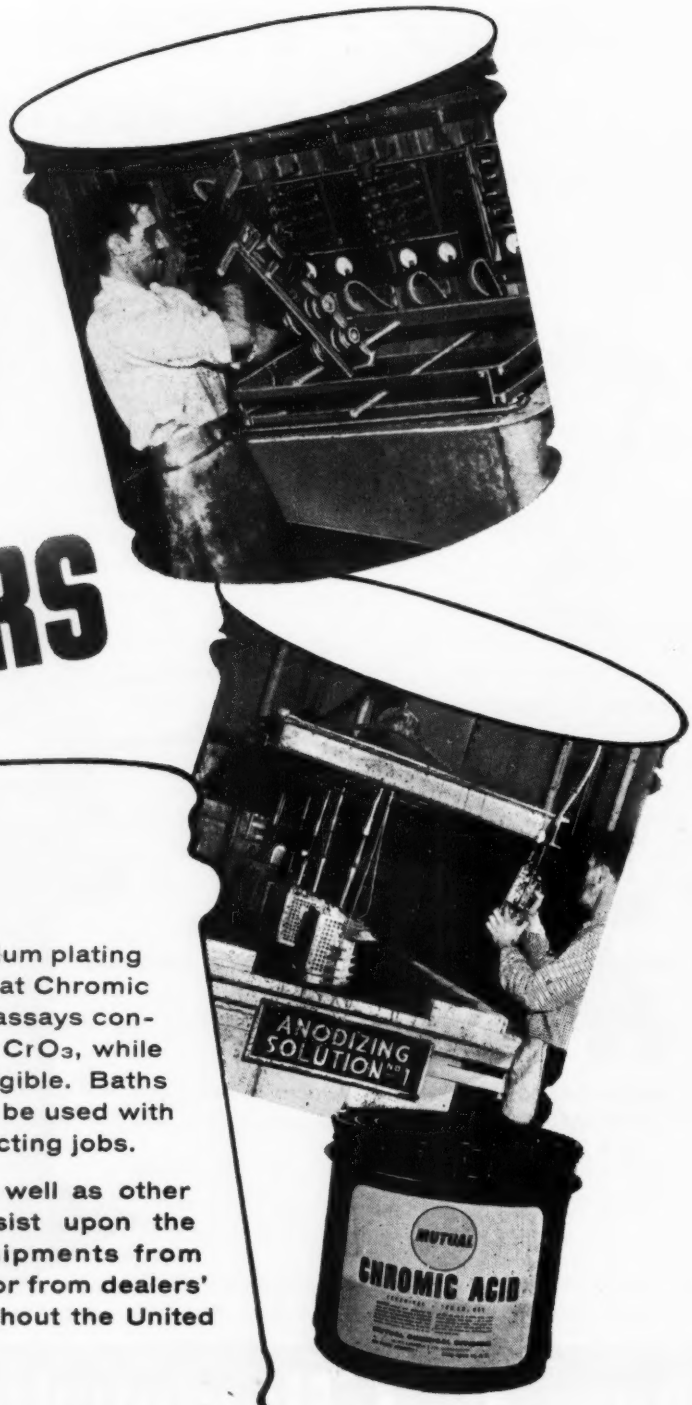
C. B. Little
Newark, N. J.

W. R. Shields
Detroit, Mich.

Gen. Office and Factory:
4521 Ogden Ave.
CHICAGO

Branches:
Cleveland
and
Los Angeles

CHROME PLATERS and ANODIZERS



Specialists in quality chromium plating and anodizing have learned that Chromic Acid bearing the Mutual label assays consistently better than 99.75% CrO_3, while the sulfate content is negligible. Baths prepared with this acid may be used with confidence on the most exacting jobs.

For Chromic Acid—as well as other Chromium Chemicals—insist upon the Mutual label. Prompt shipments from Mutual's Baltimore Plant or from dealers' warehouse stocks throughout the United States and Canada.

CHROMIC ACID SODIUM BICHROMATE
POTASSIUM BICHROMATE

MUTUAL

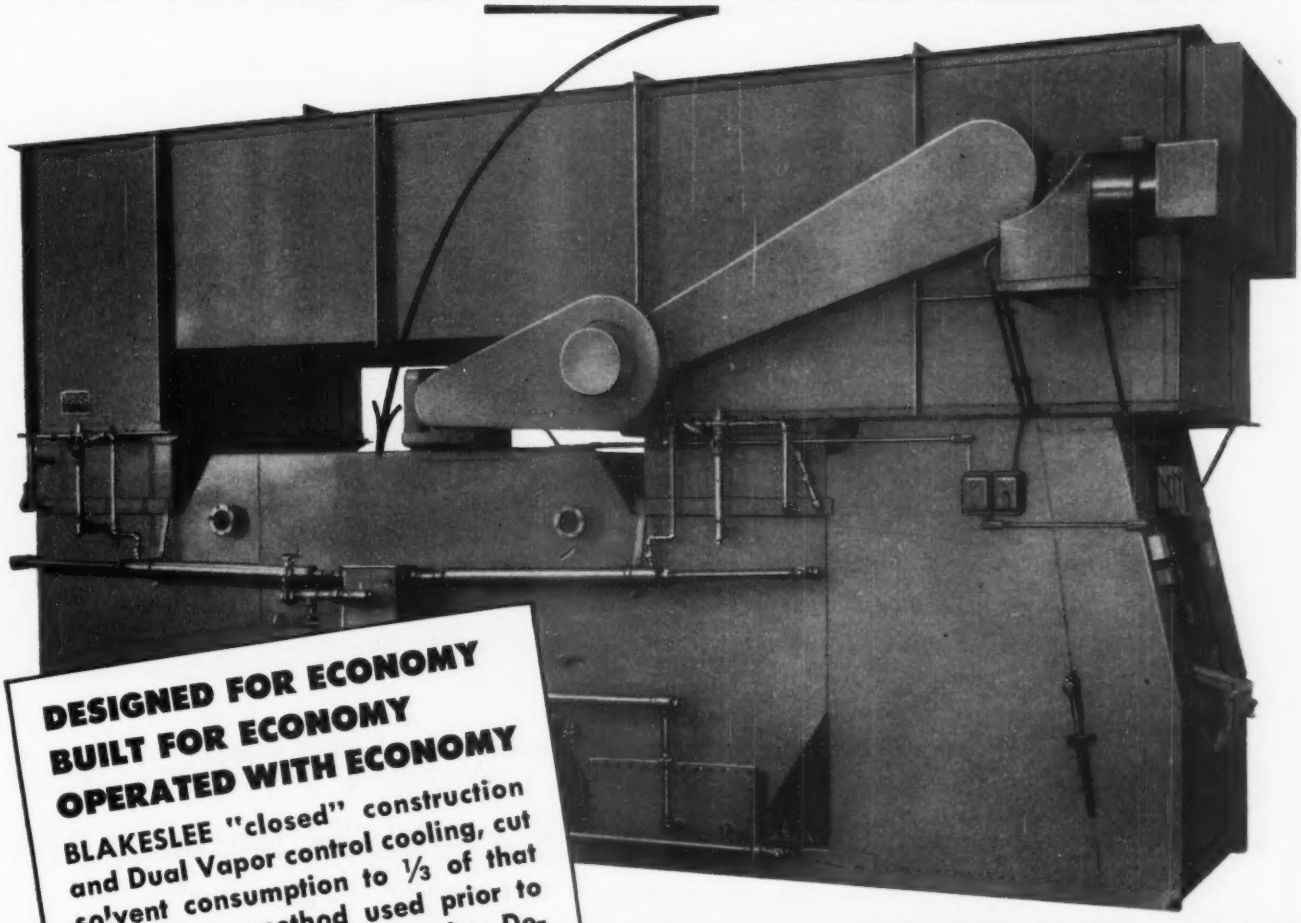
MUTUAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
99 PARK AVENUE • NEW YORK 16, N. Y.

Allied Chemical

66% Savings

IN SOLVENT CONSUMPTION

with PATENTED TUNNEL CONSTRUCTION



DESIGNED FOR ECONOMY
BUILT FOR ECONOMY
OPERATED WITH ECONOMY

BLAKESLEE "closed" construction and Dual Vapor control cooling, cut so'vent consumption to 1/3 of that required by method used prior to installation of New Blakeslee Degreaser. Further economies effected by better cleaning and fewer rejects.

*Testimonials and case records on file.

Write for complete information on Blakeslee Degreasers and Blacosolv Degreasing Solvent.

BLAKESLEE

AUTOMATIC

Solvent Vapor

DEGREASERS

G. S. BLAKESLEE & CO. 1844 S. Laramie Ave., Chicago 50, Ill.
New York • Los Angeles • Toronto

Also Manufacturers of Blakeslee Metal Washing and Surface Treatment Machines

THE FINISHING TOUCH

ALUMINUM FINISHES

by A. B. HOEFER
vice president
FREDERIC B. STEVENS, INC.

Will Anodized Aluminum Replace Nickel-Chrome Finishes?

Affirmative answers to this question are revealed in several current business publications and our own sales figures.

Speeding the change is the continued tight supply of nickel. Manufacturers have been forced to look for substitutes for nickel and like the results anodized aluminum have given them.

A trend is developing. Volume of Stevens Automatic anodizing equipment sold in 1955 was nearly double the volume for the two preceding years. At the same time, sales of Stevens compositions used in buffing and polishing aluminum were showing a 50% increase.

Frederic B. Stevens, Inc., manufacture equipment for both nickel-chrome and aluminum finishes. We believe both types of finishes will increase in demand but at the moment the interest in aluminum is high.

If you are considering aluminum for your product, you can be assured that aluminum parts can be bright anodized and finished to compare favorably with the fine finish of chrome plate. In addition, aluminum can be dyed, resulting in non-fading colored finishes.

THE TREND INDICATES MORE ANODIZED ALUMINUM IN 1957 and 1958!

This Stevens advertisement, predicting an increasing use of anodized aluminum, ran over a year ago.

SEE STEVENS FOR AUTOMATIC ANODIZING EQUIPMENT

The increasing demand for more color and more elaborate styling is rocketing the use of anodized aluminum for tumblers, kitchen utensils, refrigerator components, lighting reflectors and many other items.

The 1957 motor cars are using anodized aluminum for medallions, kick plates, grilles, window frames, etc.

To obtain the finest aluminum finishes — at the lowest costs — see your Stevens Representatives. Stevens' experience in furnishing complete anodizing equipment assures you of the latest techniques and the best in automatic machines. Let us discuss your requirements with you.

FOR FURTHER INFORMATION WRITE TO: *FREDERIC B. STEVENS, INC.*
1820 - 18th STREET, DETROIT 16, MICHIGAN

STEVENS 75 YEARS OF SERVICE

FREDERIC B. STEVENS INCORPORATED
YOUR METAL FINISHING SUPERMARKET
DETROIT 16, MICHIGAN

WAREHOUSES AND
OFFICES IN PRINCIPAL CITIES

"Dave, that Dow Methylene Chloride sure cured our stripping problems with masking lacquer"

"It sure did, Jess. It takes minutes to do jobs that other cleaning and stripping compounds take *hours* to do."

"Wonder why?"

"Two reasons. One is high solvent power. Dow Methylene Chloride penetrates coatings faster. The other is that it immediately starts an evenly distributed lifting action that really loosens things up."

"Would it strip those new parts we got in last week?"

"Probably would. They use Dow Methylene Chloride for all sorts of formulations to strip paint, varnish, lacquers and epoxy resins. Good vapor degreasant, too. Sometimes it's possible to use methylene chloride in a common vapor degreaser."

"Is it safe, Dave?"

"It's nonflammable and carries a low toxicity rating—the MAC is 500 ppm. Very stable, too!"

"Sounds better all the time. Tell me more."

"That's all I know, but the Dow people can answer all your questions. Why don't you write them a note?"

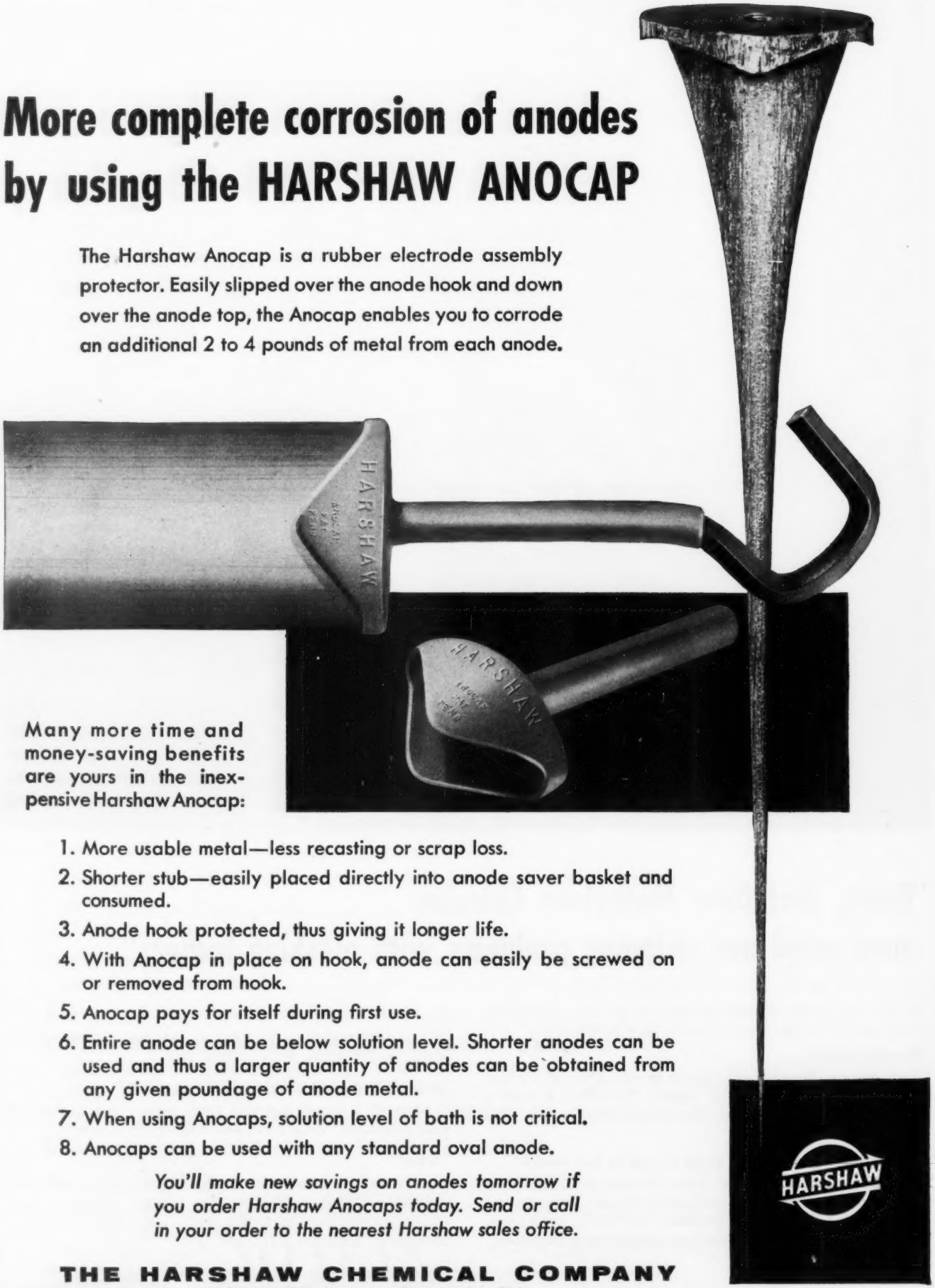
"Who?"

"You know, they make Dow Perchloroethylene Industrial and Dow Trichloroethylene for vapor degreasing, and Chlorothene® for cold cleaning. THE DOW CHEMICAL COMPANY, Midland, Michigan."

YOU CAN DEPEND ON DOW

More complete corrosion of anodes by using the HARSHAW ANOCAP

The Harshaw Anocap is a rubber electrode assembly protector. Easily slipped over the anode hook and down over the anode top, the Anocap enables you to corrode an additional 2 to 4 pounds of metal from each anode.



Many more time and money-saving benefits are yours in the inexpensive Harshaw Anocap:

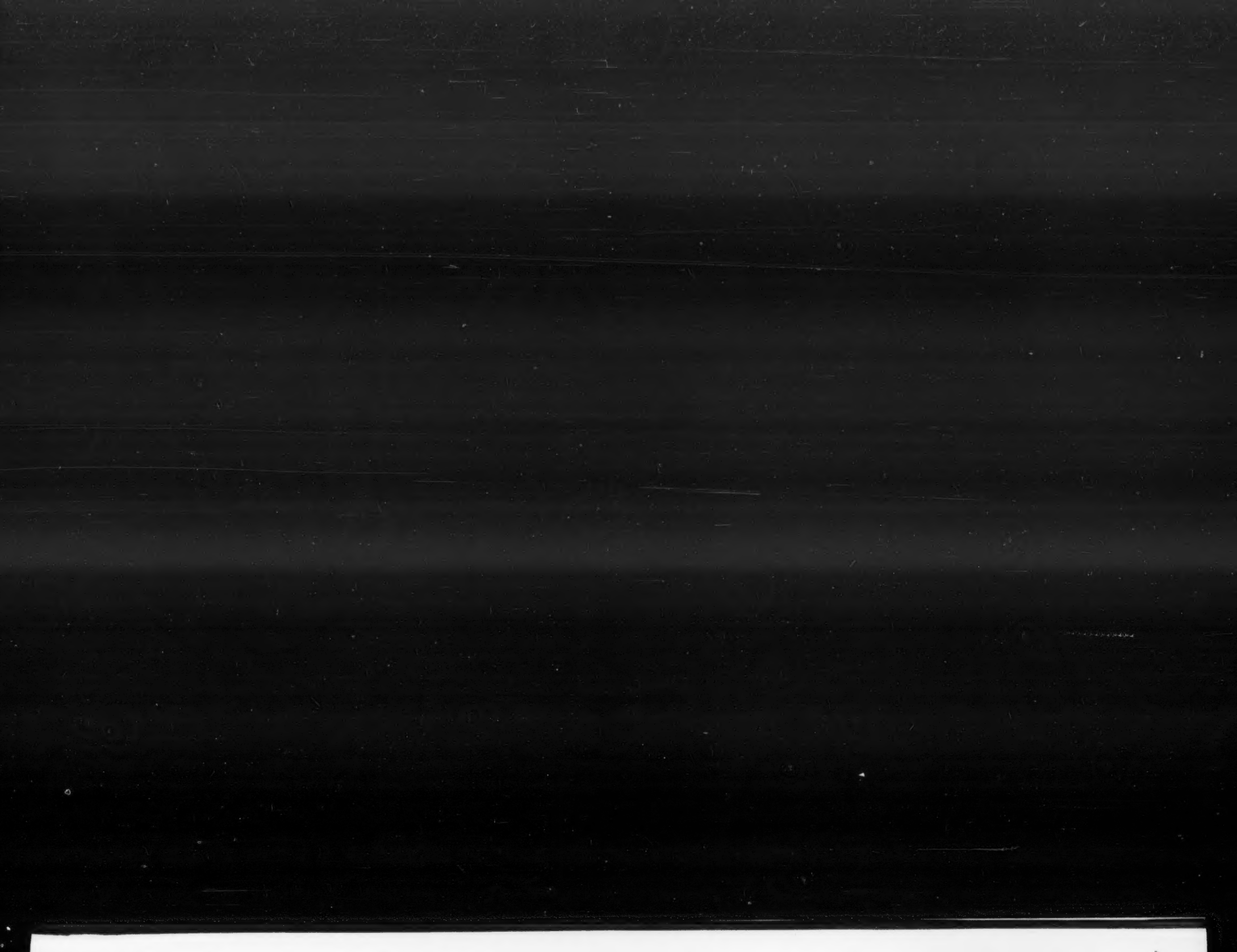
1. More usable metal—less recasting or scrap loss.
2. Shorter stub—easily placed directly into anode saver basket and consumed.
3. Anode hook protected, thus giving it longer life.
4. With Anocap in place on hook, anode can easily be screwed on or removed from hook.
5. Anocap pays for itself during first use.
6. Entire anode can be below solution level. Shorter anodes can be used and thus a larger quantity of anodes can be obtained from any given poundage of anode metal.
7. When using Anocaps, solution level of bath is not critical.
8. Anocaps can be used with any standard oval anode.

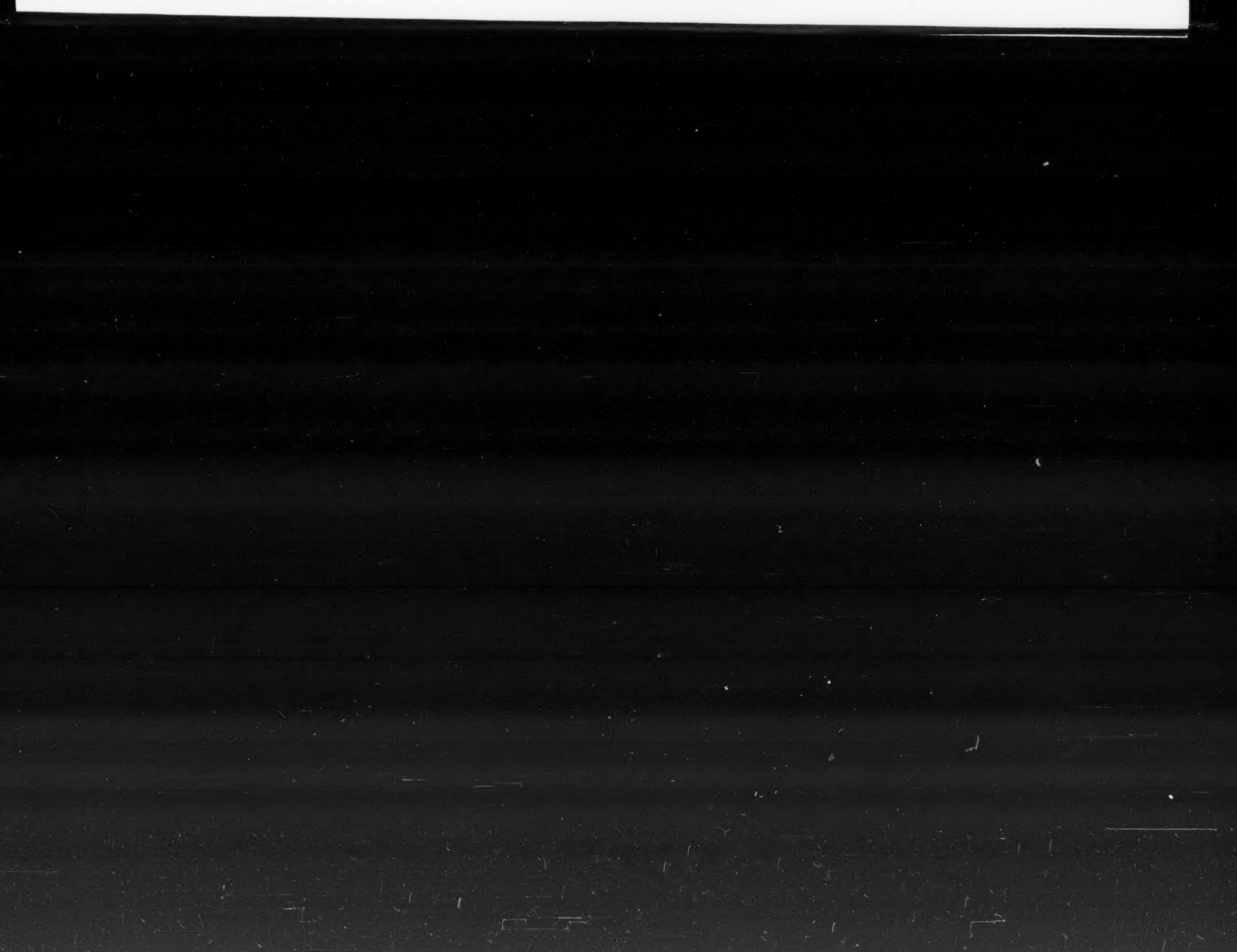
You'll make new savings on anodes tomorrow if you order Harshaw Anocaps today. Send or call in your order to the nearest Harshaw sales office.

THE HARSHAW CHEMICAL COMPANY

1945 East 97th Street • Cleveland 6, Ohio

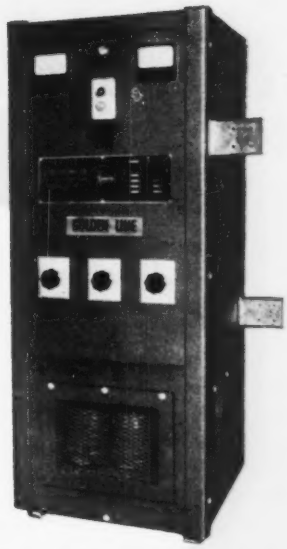
Chicago 32, Ill. • Cincinnati 13, Ohio • Cleveland 6, Ohio • Houston 11, Texas • Los Angeles 22, Calif.
Detroit 28, Mich. • Philadelphia 48, Penna. • Pittsburgh 22, Penna. • Hastings-On-Hudson 6, N. Y.





GOLDEN LINE
GERMANIUM RECTIFIERS

Unique design and technical advances in engineering and manufacturing techniques enables RAPID to present its full output range, full control, GOLDEN rectifiers at economical prices. Engineered with economy in mind, we call it the line of the future design.



Rating 2500 Amperes, 2-12 Volts
Dimensions 60"H x 33"W x 26"D
Price available on request

Features...

- Balanced full wave circuit providing less than 5% ripple.
- Magnetic starter features overload protection against excessive power input.
- Tap switch control (42 steps) closely adjusts rectifier output over the entire range.
- Special control transformer lowers voltage level at starter control switch for greater operator safety.
- Hermetically sealed germanium diodes designed for continuous operation at ambient temperatures of 120°F.
- All GOLDEN units equipped with stop-start pushbutton, full range meters, ammeter shunt, and pilot light indicator.
- Unique switching arrangement and specially designed transformer for either low range, 2-6 volt, or high range, 7-12 volt.
- Magnetic overload protection safeguards the efficient germanium junctions using magnetic amplifier sensing coils. Automatic in action, output overload is continuously safeguarded. Providing positive protection, the unit shuts off instantaneously in the event of overload.

Rating 750 Amperes, 2-12 Volts
Dimensions 42"H x 22"W x 20"D
$995 F.O.B. N. Y.

3000 Amperes, 2-12 Volts
5000 Amperes, 2-12 Volts
(Models not shown)

The line of the Future Design

Efficiency

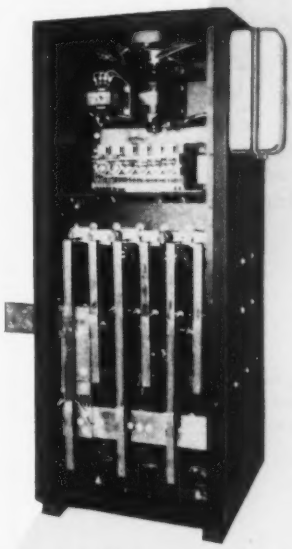
Designed for continuous operation at full load, the GOLDEN LINE of RAPID germanium rectifiers provides exceptional efficiency using quality junctions of low forward resistance, high inverse resistance and low heat generation.

Dependability

Rapid's extensive experimental and application experience together with high quality components assures long life, dependable performance.

Economy

Unique engineering design and technical advances have lowered the cost of these full range output, full control, GOLDEN rectifiers.



Rating 1500 Amperes, 2-12 Volts
Dimensions 60"H x 24"W x 24"D
Price available on request

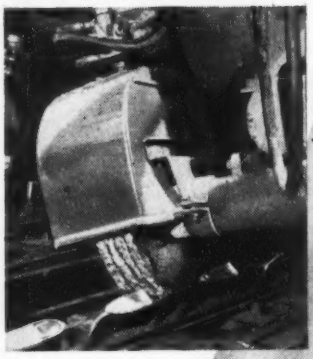
Input for all models
220/3 ph/60 cyc
440/3 ph/60 cyc

Remember.... RAPID ELECTRIC CO. MEANS: "More power to you!"

RAPID ELECTRIC COMPANY

2881 MIDDLETOWN ROAD • NEW YORK 61, N. Y. • TALMADGE 8-2200

ALWAYS FINISHES FIRST



and cuts costs two ways because it's completely automatic!

fast cutting, easy cleaning with

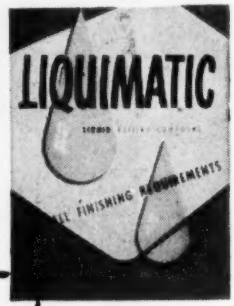
Liquimatic®

the perfect liquid compound for all metal finishing

What are the two big cost factors in your buffing room? Chances are *buff life* figures big when you're talking production costs . . . and the second big factor is *production time* itself. Liquimatic Application Systems are licking these two cost problems in buffing rooms all over the U. S.—because Liquimatic is automatic. An electrically timed system feeds Liquimatic Buffing Compound to the buff in the exact amount to give you the exact cut you need. Because the buff is continually lubricated, buff life is extended up to 200%!

And with Liquimatic there's no compound wasted, no nubbin problem, no hand application, no changing bars—think of the cost savings you can effect in *your* buffing room with these advantages! Savings in buff life alone can soon pay for a complete Liquimatic Application System . . . a system that will continue to save you money—*automatically*.

Check the other features of Liquimatic Buffing Compound . . . then write today for your free copy of Liquimatic's big, new folder that tells the whole cost-saving story of Liquimatic in *your* buffing room.



These additional Liquimatic features mean real savings in terms of time, money, safety—

- longer buff life
- completely automatic
- fast cutting
- easy cleaning
- non-settling
- high flash point
- long storage life
- sprayable viscosity
- adhesive slow-wearing buff face

Liquimatic ***. . . gives more buff mileage***

PLATEMANSHIP

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

HANSON-VAN WINKLE-MUNNING COMPANY

Main Office and Plant, Matawan, New Jersey

J. C. Miller Division, Office and Plant, Grand Rapids, Mich.

SALES OFFICES: Anderson (Ind.) • Baltimore • Beloit (Wisc.) • Boston Bridgeport • Chicago • Cleveland • Dayton • Detroit • Grand Rapids • Los Angeles • Louisville • Matawan • Milwaukee New York • Philadelphia • Pittsburgh • Plainfield • Rochester St. Louis • San Francisco • Springfield (Mass.) • Utica Wallingford (Conn.)

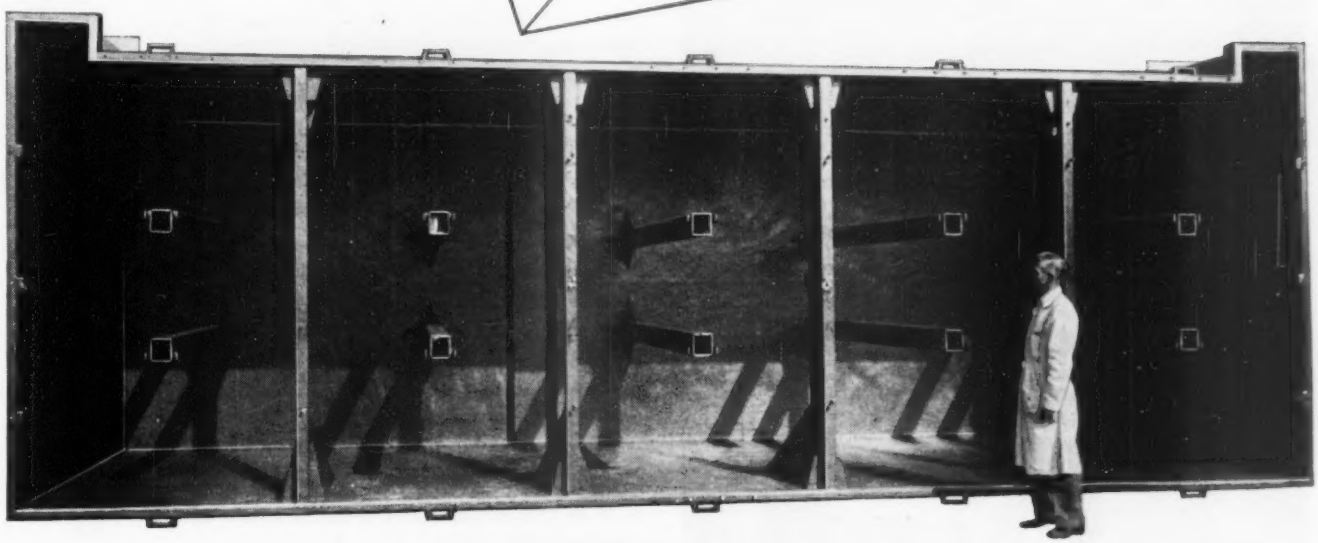
H-VW-M

INDUSTRY'S WORKSHOP FOR THE FINEST IN PLATING AND POLISHING PROCESSES • EQUIPMENT • SUPPLIES

MICCROSOL

SPRAY S-2003

helps *Udylite* break another size barrier!



30' x 9' x 9' 4" plating tank lined by Udylite with Miccrosol Spray S-2003.

Another size barrier in the coating industry was broken when this 11½-ton plating tank was lined with a 3/16"-3/8" coat of Miccrosol Spray S-2003. The combination of Udylite's efficient 31-foot oven and Miccrosol Spray S-2003 made it possible.

The tank was placed in the oven, coated by spraying, and then cured. When removed, the job was complete.

Miccrosol Spray S-2003 was selected by Udylite for this job both because it could be applied under these unusual conditions and for its outstanding performance as a lining for plating tanks. This material, combined with their facilities, enabled them to turn out a top quality coating job which heretofore would have been impossible.

Write for complete information on your company letterhead.

IT'S TOPS !

Micro Products *Developed and manufactured by experienced platers and coaters.*

MICHIGAN CHROME *and Chemical Company*

8615 GRINNELL AVENUE • DETROIT 13, MICHIGAN

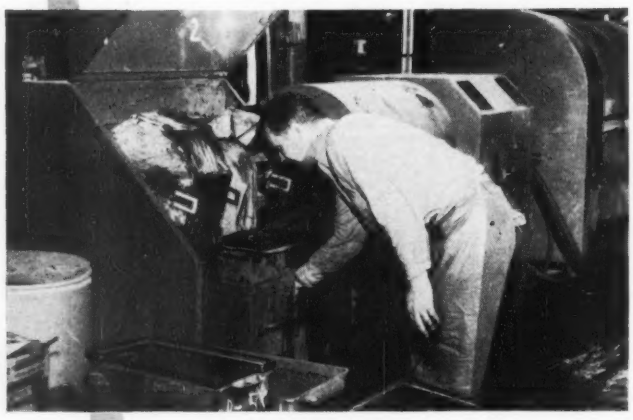
For Faster, Safer, More Economical
METAL CLEANING...

Cleaning and polishing metal parts with IMMUNOL

USE TRIPLE-ACTION, NON-FLAMMABLE, *LOW COST*

IMMUNOL

(Reg. U.S. Pat. Off.)



Cleaning and rustproofing in a tumbling operation with IMMUNOL prior to plating

Using IMMUNOL to remove grease from cold finished bar stock in a dip tank operation

IMMUNOL quickly cleans soils, gummy deposits, dirt and foreign matter from any metal surface...*thoroughly degreases metal...leaves a protective rustproof coating as it cleans*—all in one operation! In addition, IMMUNOL:

- **ELIMINATES *the fire hazard* of solvents since it is non-flammable.**
- **REPLACES MORE EXPENSIVE, less efficient soaps, alkalies and solvents.**
- **IS NON-TOXIC so operators can use it without fear of skin irritations.**
- **IS ODORLESS to increase operator efficiency.**
- **IS INEXPENSIVE. Only a few ounces of IMMUNOL per gallon of water are required to produce a gallon of solution. This solution can be used over and over again once the foreign matter has been removed.**
- **IS NEUTRAL CHEMICALLY having a pH of 7.0.**
- **IS MIXED WITH HOT OR COLD, HARD OR SOFT WATER.**

Here are just a few unsolicited comments from IMMUNOL users: "We estimate IMMUNOL saves us $30,000 to $40,000 per year in materials, time and labor"; "IMMUNOL saves $700 per week over vapor degreasing"; "I account for the terrific improvement in a simple operation to the better cleaning by IMMUNOL."

***TEST IMMUNOL** at our expense. Write for a free sample today. Ask for details on the many other applications for IMMUNOL, too.*

HARRY MILLER CORP. HAMICO 4th & BRISTOL STREETS PHILADELPHIA 40, PA.

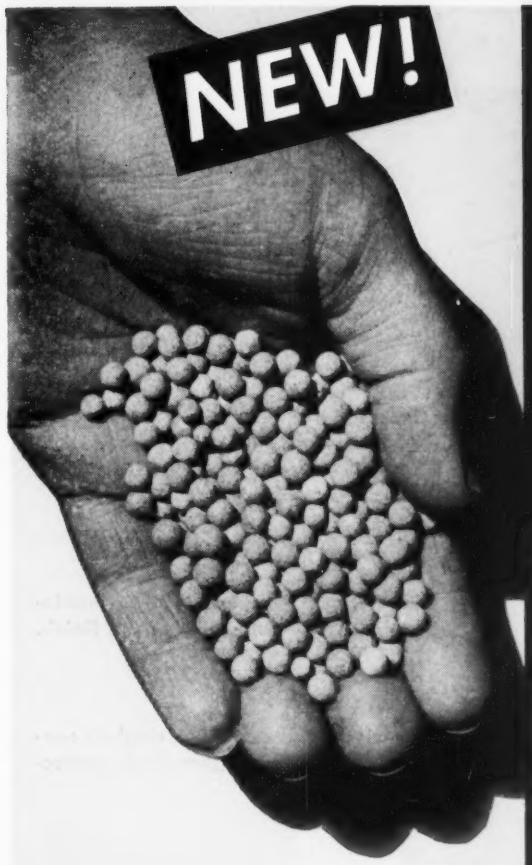
Manufacturers of STEELGARD, HAMIKLEER, ACTIVOL, HAMICOTE

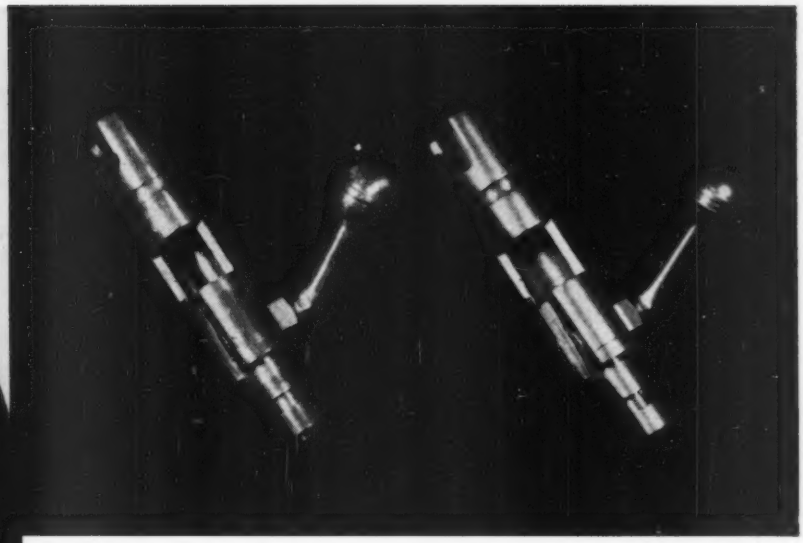
HARRY MILLER CORP.

Original Products and Processes Since 1936

4th and BRISTOL STS., PHILA. 40, PA.

DAvenport 4-4000 *Service Representatives in Principal Cities*





The new ALUNDUM Tumblex "S" abrasive rolls around and through intricate parts; brings high uniformity of radii and surfaces, with smooth finish, to the barrel-finishing of parts as intricate as this gun component. The "before and after" view shows you how the spheres improve external and *internal* areas.

Besides this 3/16" diameter size of Tumblex "S" you can order it in four other sizes, up to 7/8". This means top barrel-finishing performance for you, in many different applications. And these new spheres are exceptionally dense and long-lasting.

Another big advance in barrel-finishing

Norton Tumblex "S" abrasive spheres

From the pioneer of ALUNDUM bonded triangles — now, new bonded spheres to help you do a better job*

If you finish parts that have hard-to-contact recesses or intricate shapes, Tumblex "S" tumbling abrasive is the latest development.

Here are the reasons why tubing, coil springs, scissor handles, bearing retainers, pump bodies and many other parts benefit by the new shapes and sizes of Tumblex "S" — and its top-quality as a tumbling abrasive.

- *Tumblex "S" is made in spheres that easily get into areas where other abrasive shapes can't reach.*
- *Made of famous Norton ALUNDUM abrasive, it cuts fast — resulting in shorter time cycles and lower costs per piece finished.*

5 Different Diameter Sizes

#2—7/8"	#4—3/8"
#3—5/8"	#5—9/32"
#6—3/16"	

Send Your Work Samples

Let us demonstrate in our newly enlarged Sample Processing Department how Tumblex "S" Abrasive can give the value-adding "Touch of Gold" to your product quality and cut your barrel-finishing time and costs. NORTON COMPANY, Worcester 6, Mass. Distributors in all industrial areas, listed under "Grinding Wheels" in your phone book, yellow pages. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts.

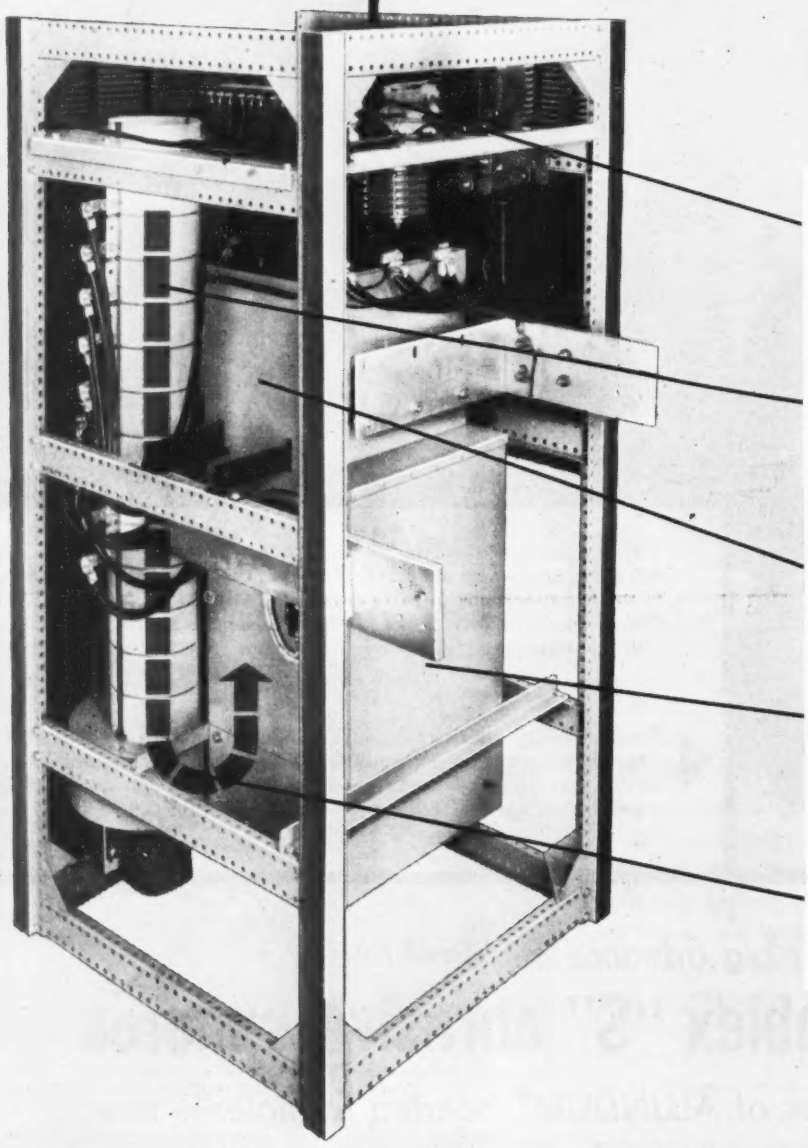
G-321

*Trade Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES

Making better products... to make your products better

NORTON PRODUCTS:
Abrasives • Grinding Wheels
Grinding Machines • Refractories
BEHR-MANNING PRODUCTS: Coated Abrasives
Sharpening Stones • Behr-cat Tapes



Automatic voltage control contains no moving parts or electronic tubes.

This tube contains time-proven General Electric germanium cells, each hermetically sealed in stainless-steel-ceramic enclosure for maximum corrosion resistance.

Transformer, protected by double-impregnation with alkyd-resin finish.

Reactor provides instant, stepless control plus built-in short-circuit protection.

Powerful blowers supply high-velocity cooling air blast (red line) past cells, through reactor and transformer.

General Electric announces a

TO: GENERAL ELECTRIC COMPANY
Section 463-15, Schenectady 5, N. Y.

Gentlemen:
Please send me bulletin GED-2934, "General Electric Automatic Germanium Plating Rectifier."

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____

Progress Is Our Most Important Product

GENERAL ELECTRIC

RELEASE THIS MAN FOR MORE PRODUCTIVE WORK . . . no further need for him to continually correct output in order to get high-quality work. Just set it and forget it. This unit corrects faster, more accurately than the most-skilled operator. You get uniform power for most profitable plating.

NEW line of low-priced automatic germanium plating rectifiers

Examples: 9-volt/1500-amp, $1890; 12-volt/1000-amp, $1750

COMPLETE with remote automatic voltage control

Here's the biggest advance in plating rectifier technology since the introduction of germanium: *automatic control at low prices*!

With automatic control, you simply set the output you want on the remote-control panel. This output is maintained automatically, regardless of changes in tank load or variations in a-c input voltage. The result is a uniform product from rack to rack—not too much deposition, which wastes valuable anode material, time, and labor; not too little deposition, resulting in costly rework.

The low price results from: (1) successful adaptation to plating equipment of a low-cost saturable reactor circuit, long recognized as the ideal control; and (2) the perfection of a new cooling technique which cools the germanium cells from *both* sides and force-cools the reactor and transformer for long life.

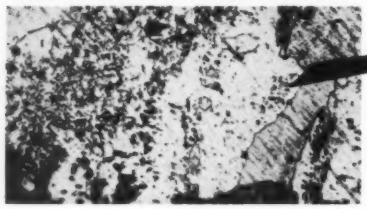
Ratings *are now being built* from 6-volt/750-amp to 250-volt/140,000-amp, air-cooled and water-cooled. Ask your General Electric plating equipment supplier for more information, or send in the coupon for bulletin. General Electric Co., Schenectady 5, N. Y.

17/Circle on Readers' Service Card

SHAPED, EXTRUDED ANODES

3 STANDARD SHAPES

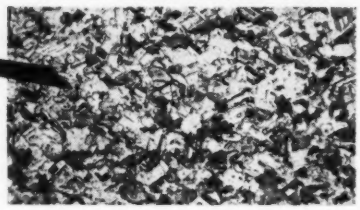
ROLLED FLAT PLATE ANODE SECTION:



This Photomicrograph shows highly irregular, uncontrolled grain size—a major cause of shedding and resultant rough electrodeposits.

Note small, fully controlled regularity of grain size that promotes uniform corrosion, smoothest electrodeposits, less rejects.

APW EXTRUDED ANODE SECTION:



THE GREATEST ANODE DEVELOPMENT IN YEARS

APW Shaped, Extruded Anodes were developed to extend the useful life of our anodes . . . to assure uniform and consistently smooth electrodeposits . . . to minimize shedding. They accomplish these objectives for our customers day after day—and in addition, *they have helped to lower plating costs!*

The anodes are scientifically shaped to retain 80% of original surface area *after 85% by weight has been plated off!* You get longer anode life, minimized polarization and less silver scrap to be refined.

The APW Extrusion Process* assures small, uniform grain size controlled between definite, ideal limits. Corrosion is smooth, shedding is virtually eliminated, rejects are a comparative rarity.

Be certain the silver you buy in anodes is used most efficiently and economically. Our service department will be glad to develop special anode shapes to meet your particular plating bath conditions. Call or write for a representative, we'll be glad to assist with your anode problems. ★ ★ ★ ★ ★ ★

*Pat. Pending

THE AMERICAN PLATINUM WORKS

231 NEW JERSEY RAILROAD AVENUE • NEWARK 5, NEW JERSEY

APW

ENGELHARD INDUSTRIES

Only **American**

CENTERLESS BUFFS

give you

7 KEYS

to GREATER OUTPUT!

7 TYPES SUIT EVERY JOB!
U.S. Pat. No. 2,582,506
Centerless BIAS CLOTH Buff
Centerless BIAS SISAL Buff
Centerless UNIT SISAL Buff
Centerless (Sewed) UNIT CLOTH Buff
Centerless (Unsewed) UNIT CLOTH Buff
Centerless OPEN BIAS SISAL Buff
Centerless PLEATED CLOTH Buff

Exclusive PRE-ASSEMBLY means
FEWER Changeovers . . . FASTER Changeovers

Patented American "Centerless" Buffs *run cooler . . . last longer . . .* allow *faster machine speeds* without burning. *FEWER* changeovers!

Patented "Pre-Assembly"* permits making up complete buffing heads (up to 100 sections each) *in advance . . .* for *instant* replacement in a *single operation.* *FASTER* changeovers!

*U. S. Pat. No. 2,599,785

This is why
American CENTERLESS BUFFS
Guarantee 25% to 33⅓% more production

In most plants, the two biggest cost-items are Labor and Overhead (including Equipment) . . . almost 80% of total buffing costs! Revolutionary American "CENTERLESS" Buffs help you *reduce* these costly factors . . . *increase* production per man-hour and machine-hour!

27% more output on aluminum castings

33⅓% more output on brass

Certified Gains
WE CAN DUPLICATE IN YOUR PLANT
Ask for demonstration!

30% more output on copper

31% more output on steel

American Buff Company

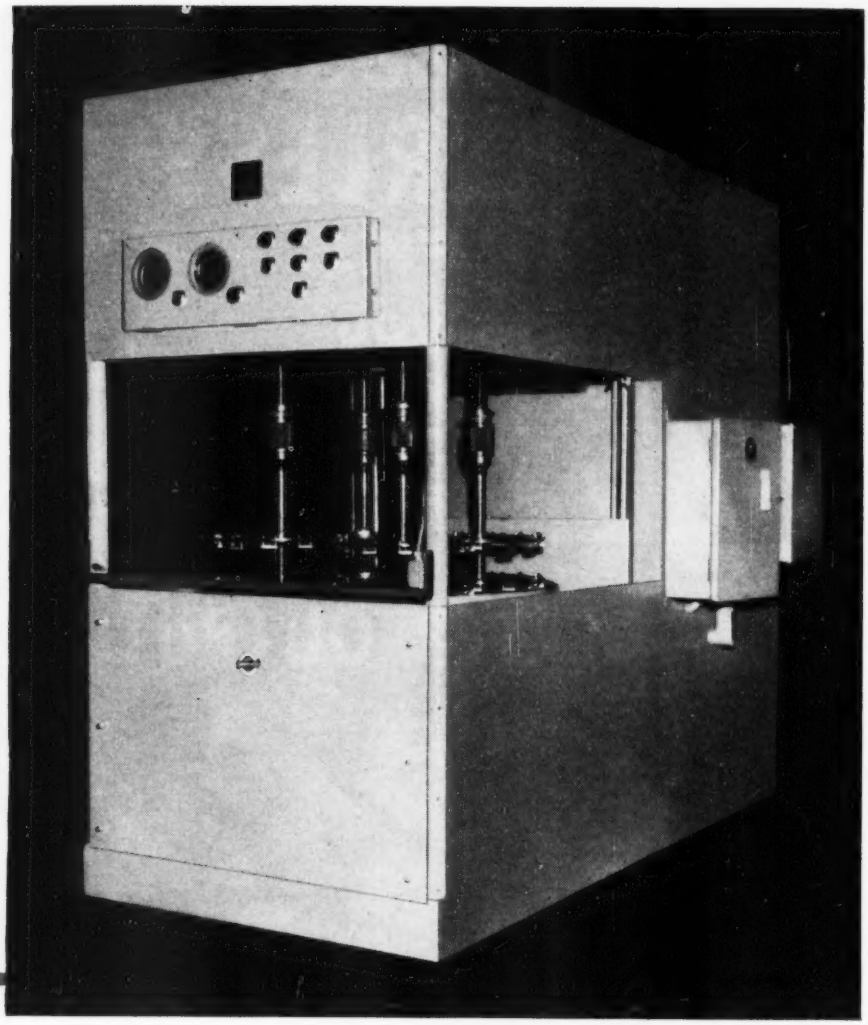
2414 S. La Salle St., Chicago 16, Ill. • CAlumet 5-1607

For the job that's tough . . . use an American Buff!

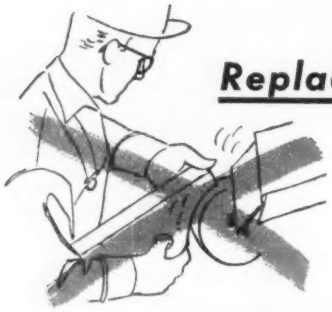
TUMBLE
GRAV-I-FLO
FINISH

OFFERS

Spin-Finish



AN ENTIRELY NEW PARTS-FINISHING PROCESS



Replaces hand and automatic buffing!

- ☑ One-operation finishing, even of the most complex parts
- ☑ Completely dry process . . . no lubricants needed
- ☑ Dust and fume free . . . no need for exhaust or ventilating systems
- ☑ No set-up time required for changing jobs

Sets New Standards In Pre-Plating Finishing Costs

Wipe the slate clean of all present concepts of speed, efficiency and costs in pre-plating finishing of brass, zinc-base and aluminum die-cast parts! In one short, automatically-timed operation—and on a *multiple mounting* of parts—new SPIN-FINISH produces surfaces and lustre equal to or surpassing that of buffing.

Savings on time, labor and plant space are tremendous! Eliminated are vast exhaust and ventilating systems! You'll want to learn all about this startling revolutionary method of finishing. Write for complete information now.

GRAV-I-FLO CORPORATION

Dept. MF-2, 400 Norwood Avenue, Sturgis, Michigan

THE NEWEST ACHIEVEMENT IN COLD SPRAY CLEANING

Jet 50

JET 50 HAS EVERYTHING IT TAKES TO SET NEW RECORDS FOR SPRAY CLEANING EFFICIENCY IN YOUR PLANT.

- A non-foaming spray cleaner that works at room temperature.
- Safe for use on all metals.
- A positive rust inhibitor.
- Moderate cost. Long life at top efficiency.
- Heavy dirt load capacity.
- Maintains pleasant odor even with heavy dirt load.
- Prevents bacterial growth. Nontoxic. Non irritating to skin.
- Can be used hot as well as cold. No disposal problem.

Remember — YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER

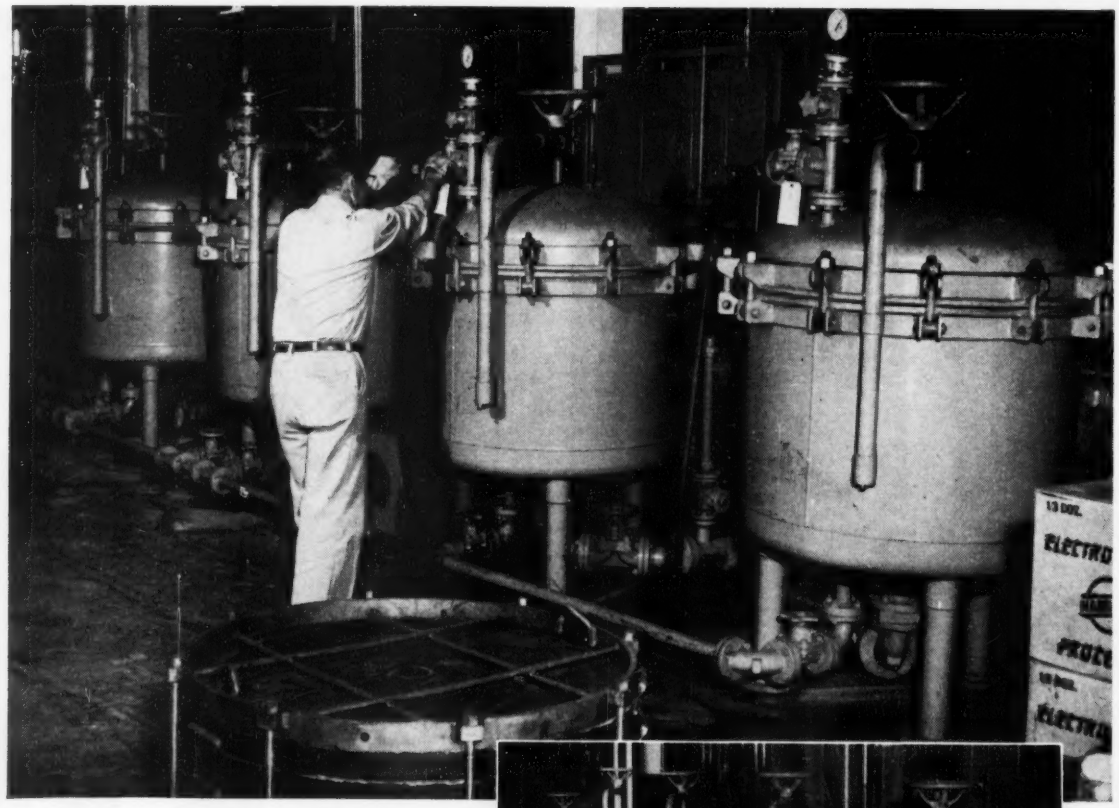
LO HI pH

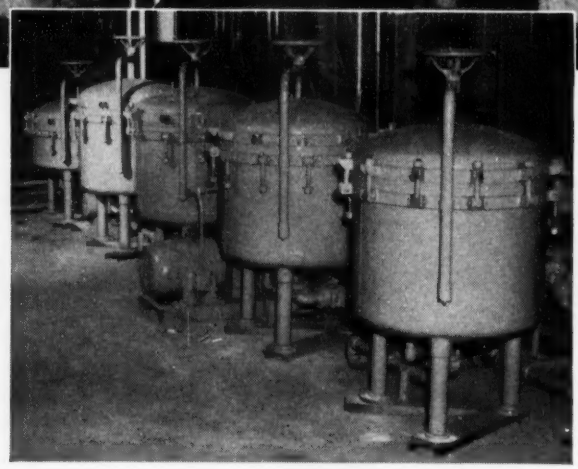
Let the Northwest Cleaning Specialist explain how Jet 50 can improve your production.

NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.

pioneers in pH cleaning control serving you since '32





High Flow Rates Low Servicing Cost *give* Low Cost Filtering of Plating Solutions–

2,208,000 gals. of bright nickel solution are filtered in these four Sparkler Horizontal Plate filters (top illust.) through a continuous 5 day cycle with 24 hour operation. Filters are cleaned once a week by lifting out the plate cartridge and replacing it with a fresh dressed set of plates. Only a few minutes is required for this operation.

In the same plating plant, (lower illust.) the four large Sparkler filters are used to filter suspended matter from Ronal bright copper solution. These filters have a flow capacity of 4800 G.P.H. each. The small, far end unit filters suspended matter from a copper strike bath. Capacity 2,100 G.P.H.

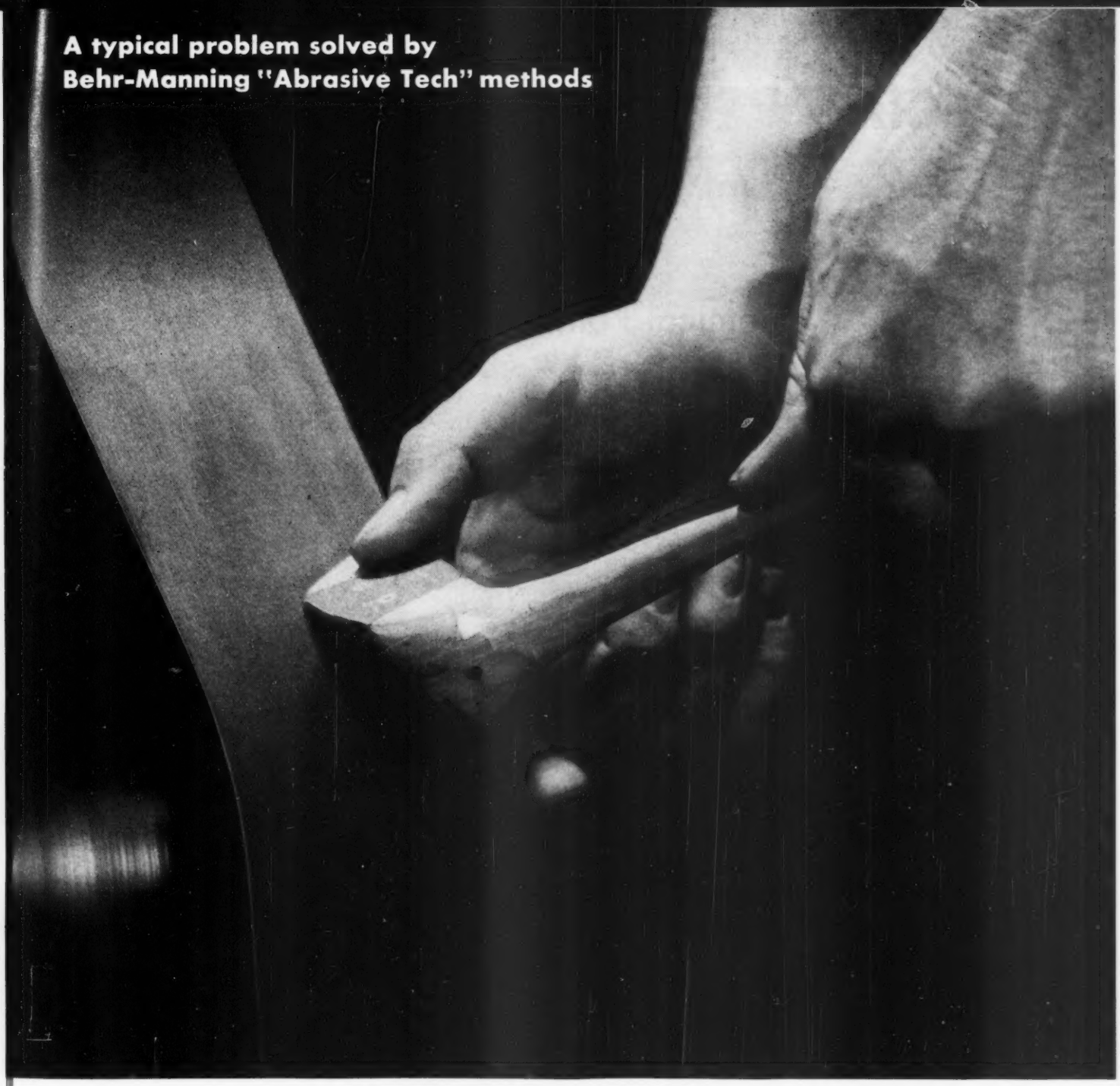
On occasion these filters are employed for filtering out activated carbon and lime from copper solution and activated carbon and nickel carbonates from nickel solution.

Plating Plant Engineers will find Sparkler filtration engineers most co-operative to work with on installations of any size.
Write Eric Anderson

SPARKLER
horizontal plate
FILTERS
(the original horizontal plate filter)

SPARKLER MANUFACTURING CO. MUNDELEIN, ILL.
Sparkler International Ltd.
Manufacturing plants in Canada, Holland, Italy, and Australia.

REPRESENTATIVES IN PRINCIPAL CITIES THROUGHOUT THE WORLD.



Cutting the cost of finishing 77% is typical of results that can be achieved in "Abrasive Tech" Methods Rooms. In this case, the manufacturer uses an Openkote Garnet Cloth 100-J belt, with a formed serrated rubber contact wheel, to sand this golf-club head and neck. The same type of belt is then used with a harder durometer, 8-in. wheel to remove scratches from the aluminum sole plate and polish it. Finishing costs have dived from 4½ cents per head to 1 cent. Maybe your production can benefit similarly from Behr-Manning technical service.

Very often a Behr-Manning methods engineer can provide a helping hand with different finishing problems. Just call the nearest Behr-Manning office for a date. There are 17 well-equipped "Abrasive Tech" Methods Rooms, available for problem-solving, or helping finishers brush up on new techniques: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, Teterboro, Camden, San Francisco, Seattle, St. Louis, and Brantford, Canada. Main office and plant: Troy, N. Y. For Export: Norton Behr-Manning Overseas, Inc., New Rochelle, N. Y., U.S.A.

BEHR-MANNING CO.

A DIVISION OF NORTON COMPANY

NORTON ABRASIVES

BEHR-MANNING PRODUCTS: Coated Abrasives • Sharpening Stones • Behr-cat Tapes
NORTON PRODUCTS: Abrasives • Grinding Wheels • Grinding Machines • Refractories

BEHR-MANNING®

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER III—Lustrous, Corrosion-Resistant Finishing with Chemical Polishing Iridite

WHAT IS IRIDITE®?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are widely accepted throughout industry as an economical means of providing corrosion protection, a good base for paint and decorative finishes for non-ferrous metals. Certain of these coatings also possess chemical polishing abilities that have luster-producing, as well as corrosion-inhibiting, effects on zinc and cadmium plate, zinc die castings and copper alloys. However, continued developments in this field have been so rapid that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this discussion of the many ways in which this chemical polishing characteristic can be used in final finishing or pre-plating treatments to produce a lustrous appearance with distinct display and sales appeal and appreciable savings in cost. Report I on decorative, corrosion-resistant finishes and Report II on paint base corrosion-resistant finishes are available on request.

The degree of luster possible on a surface is a function of the degree to which the surface can be smoothed. Leveling to provide a smooth surface can be achieved by mechanical or chemical means, or a combination of these, depending upon the luster desired and the original condition of the metal. Chemical polishing effectively imparts luster otherwise difficult and costly to obtain. For this reason, it is often used to supplement or entirely replace mechanical polishing, depending upon the application and the original condition of the metal. Chemical polishing has the additional advantage of providing overall treatment of the submerged part. It reaches into even the deepest corners and recesses that are otherwise inaccessible. Certain of the Iridites are specifically designed to perform this chemical polishing operation. Also, they provide corrosion protection as do all Iridites, thus may be used as a final finish or a pre-plating polish.

If Iridite is to be used as a final finish, in contrast to pre-plating treatment, the chromate conversion coating generated is allowed to remain, providing good corrosion resistance. Color inherent in these Iridite films ranges from a yellow cast to yellow iridescent. These coatings may be used without further treatment where this color is acceptable and good corrosion resistance is desired. Further, these basic coatings can be tinted by dyeing. Among the dye tints available are shades of red, yellow, blue and green. If desirable, the basic coatings can also be modified by a bleach dip leaving a clear bright or blue iridescent finish. In all cases bleaching reduces corrosion resistance.

As examples of this type of final finishing, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, lustrous chemical polishing of the as-cast surface of zinc die castings. Thus, in many cases, sizeable savings in finishing cost are realized by elimination of plating costs. This economical method can be used on tools, appliance parts, toy pistols, locks and many other small castings. Another example is the treatment of copper and brass parts, such as welding tips, to eliminate buffing and provide additional corrosion resistance. In many cases, handling costs are reduced appreciably by replacing piece-part handling with bulk processing. Still another example of the use of this chemical polishing and protective quality of Iridite is a simple system of zinc plate, Iridite and clear lacquer instead of more costly electroplated finishes. Typical of this type of lustrous finish are builders hardware and wire goods.

As a pre-plating treatment, in contrast to final finishes, Iridite can be used to chemically polish zinc die castings or copper prior to plating. In such cases, Iridite should be applied as an in-process step, so that the protective film is removed before the plating cycle. The savings in handling, material and labor costs are obvious. This process has made it practical to plate chrome directly over copper on steel, conserving nickel, yet producing a lustrous chrome finish. Used after stripping faulty plate in reprocessing zinc die castings, Iridite restores luster to the casting, thus making possible replating without blistering.

Other Iridite finishes are available to produce maximum corrosion resistance, a wide variety of decorative finishes and excellent bases for paint on all commercial forms of the more commonly used non-ferrous metals. As a final finish, appearance ranges from clear bright to olive drab and brown and many films can be bleached or dyed. As a paint base Iridite provides excellent initial and retentive paint adhesion and a self-healing property which protects bare metal if exposed by scratching. Iridites have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of their top performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product demands the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

Most versatile of all fully automatic plating and anodizing machines

LASALCO'S

New! Cycleflex

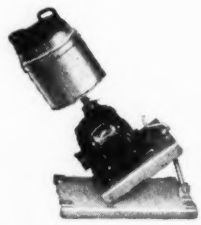
- Cycle changing requires no costly overhaul or rebuilding. Only the positions of pick-up heads need be moved, plus minor tank partition changes.
- New, simple electro-mechanical control and safety device eliminates all possibility of conveyor failure . . makes it impossible to push racks into side of tank prevents load from dropping if power fails during work transfer.
- Unusually low headroom required because no elevating mechanism operates above rack carrier.
- Self-cleaning heavy duty contacts have positive 3-point connection . . . need practically no attention.
- Easily removable rack carriers leave tank surfaces clear . . . an advantage in servicing and in manual plating of large pieces.
- Automatic loading and unloading of parts from standard double-spine racks is available . . . parts can be automatically unloaded while racks stay on machine.

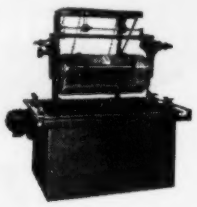
Hydraulic operation, standard; pneumatic operation, optional.

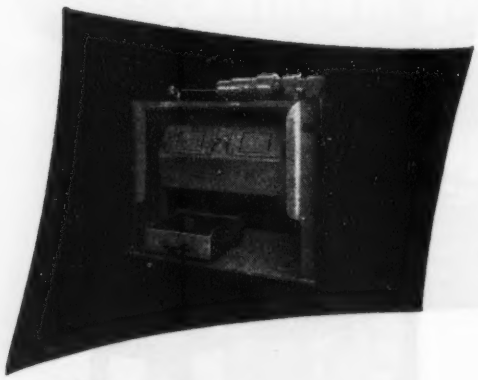
Write For Brochure

LASALCO, INC.

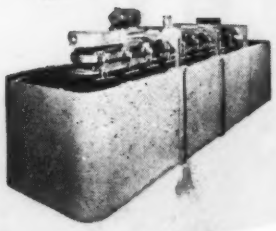
HOME OFFICE: 2820 LaSalle St. • St. Louis 4, Mo. • PRospect 1-2990
IN TEXAS: 1113 Perry Road • Irving (Dallas), Texas • BLackburn 3-4921

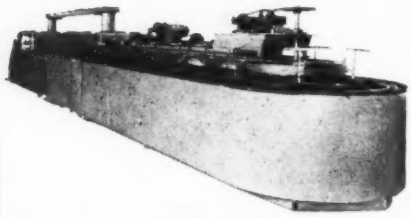




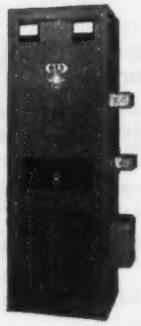


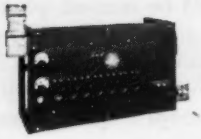
CROWN equipment

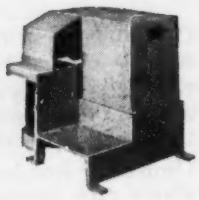


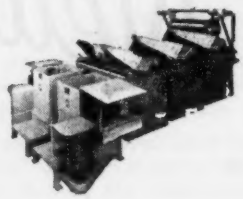


- Automatic Machines for Plating-Anodizing, etc.
- Dryers, Centrifugal
- Partially Automatic Plating Machines
- Plating Barrels
- Rectifiers
- Rheostats, Switches — Controls
- Tray — Transfer Type Cleaning — Rinsing — Dipping Units
- Tumbling Barrels — "Horizontal" — "Tilting"
- Special equipment designed and built









COMPLETE DETAILS SENT PROMPTLY ON REQUEST

CROWN RHEOSTAT AND SUPPLY COMPANY

3465 N. KIMBALL AVENUE • CHICAGO 18, ILLINOIS

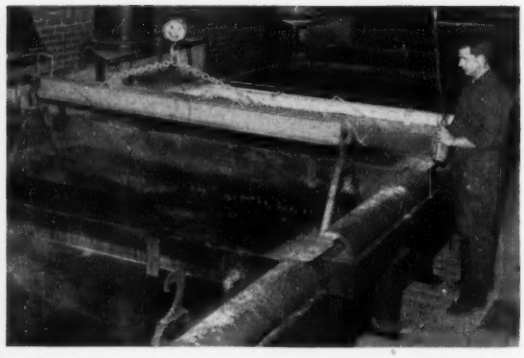
MANY FINE SURFACES REFLECT THE USE OF PFIZER CITRIC, GLUCONIC AND TARTARIC ACIDS—Pfizer Citrates, Gluconates and Tartrates contribute to brightness like you see above. Whether it be through electroplating, cleaning or polishing, these Pfizer organic acids offer many advantages to metal finishers. One big advantage is **NON-TOXICITY**—greater safety for personnel in materials handling. Another advantage is mildness—so necessary in household and specialized industrial cleaners and polishes. Write for *Technical Bulletin 61* which describes in detail the many outstanding uses for **PFIZER ORGANIC ACIDS** in metal finishing.

Manufacturing Chemists for Over 100 Years

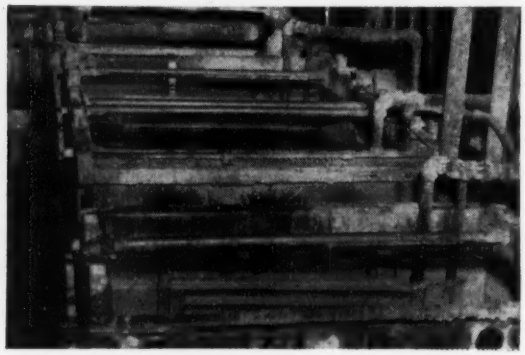
Pfizer

CHAS. PFIZER & CO., INC.
Chemical Sales Division
630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Texas

Knape & Vogt Manufacturing Co. finds Platecoil units require less tank space, reduce accidental shorting out and reduce time for cleaning because of their smooth surfaces.



Platecoil at Athens Stove Works heats 1,800 gallons of water from room temperature to boiling in 2 hours. Pipe coils require 6 to 8 hours.

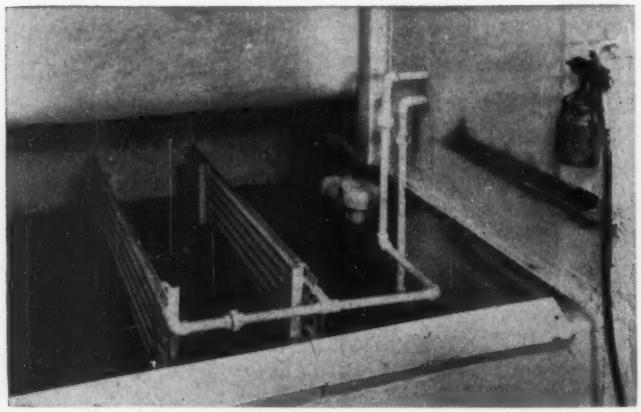


Platecoil units enable Kirsch Co. to reduce plating solution temperatures, obtain better appearance and shorten plating time. Temperature is maintained below 80° F.

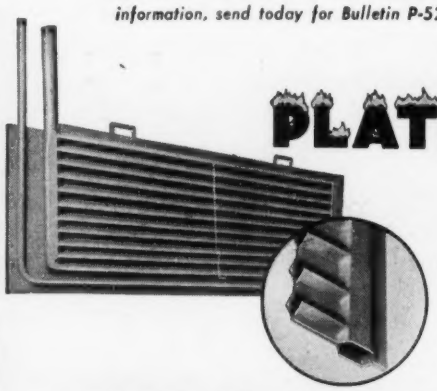
PLATING AND FINISHING MADE FASTER AND MORE PROFITABLE WITH TRANTER PLATECOIL®

Achieving more production in less time at lower cost helps sweeten the profit picture for platers and finishers. Tranter Platecoil units slash non-productive downtime, increase tank capacity and shorten operating cycles to make productive time more profitable. Greater prime heat transfer surface cuts heat up time compared to that required by old-fashioned pipe coils. Compact design gives more capacity in the tank for work loads compared to the space left by bulky pipe coils. The smooth surface of Platecoil resists fouling by deposits to cut cleaning requirements and to maintain efficiency. Easier to clean than a jumble of pipe coils, Platecoil units also save maintenance time. You'll find it profitable to use Tranter Platecoil.

It's TIME (and money) you save with Tranter Platecoil units. Order them now. Or for more information, send today for Bulletin P-52.



Space limitations in the Addressograph-Multigraph plating department led to use of Platecoil. It cost less than pipe coils, improved efficiency and cut maintenance 50%.

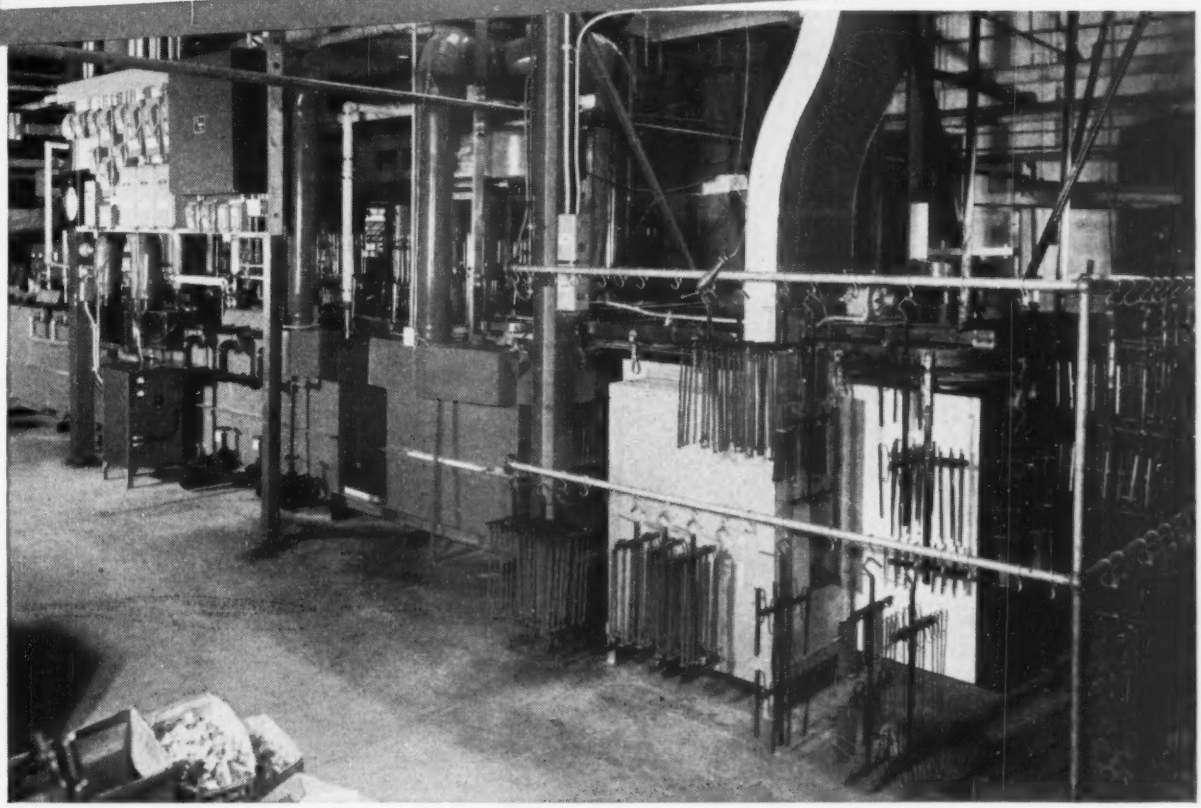


PLATECOIL®
DIVISION

TRANTER MFG., inc., Lansing 4, Michigan

You'll find our Catalog in Sweet's Plant Engineering File

A BRIGHT FUTURE IN MUSIC STANDS WITH UDYLITE HI-C BRIGHT NICKEL



Krauth and Benninghofen, of Hamilton, Ohio, has been making music stands for almost a hundred years. Now a third generation continues the operations making about 99 percent of all the music stands sold in the United States.

Last year Udylite Bright Nickel 514H, the high chloride, high speed process, with a bright chrome overlay replaced the single step gray nickel which had long been the standard music stand finish.

The sales appeal of the bright nickel bright chrome finish forced higher production to meet the 20 per cent sales increase.

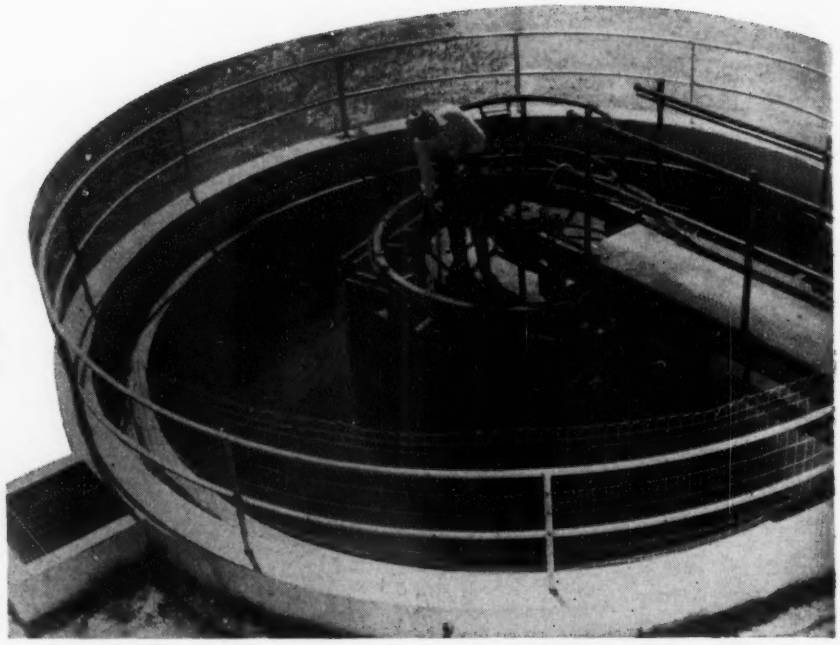
The operation of a Udylite high production Full Automatic Plating Machine enables these people to apply the new double process finish with precision and to get this better appearance and better corrosion resistance *at lower unit cost.*

Update *your* finish, *your* production and *your* costs with all of the advantages of Udylite Processes and Equipment.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

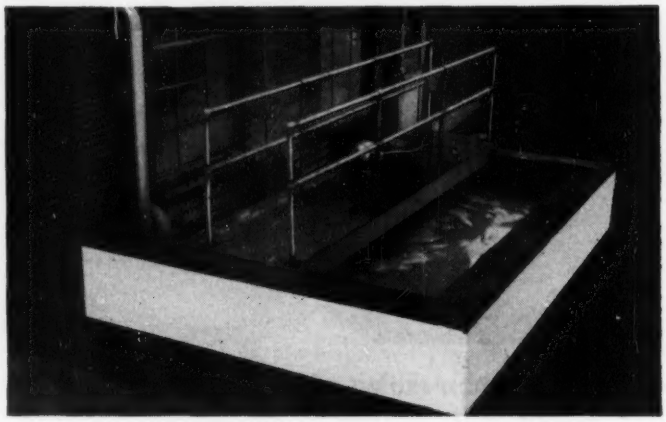
WORLD'S LARGEST PLATING SUPPLIER

Disposal of metal finishing wastes—as easy as 1-2-3!



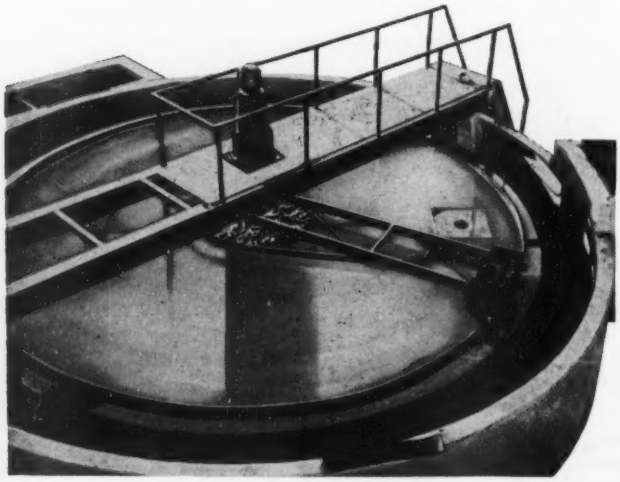
Treatment of pickle liquors, detergents, plating solutions, coolants and rinse waters is rapid and economical when you use INFILCO equipment. One or more of the units shown here will provide a permanent solution for your waste disposal problem.

1. CYCLATOR® Clarifier: A high-capacity unit for removing metals, soluble oils and suspended solids, and for pH adjustment.



2. VORTI-MIX® Circulator: For primary treatment of plating wastes which contain chromates and cyanide. Also applied to pickle liquor neutralization and cracking of oil emulsions.

3. PRIMARY CLARIFIER: For recovery of oil and removal of settleable solids when two stage treatment is required.



The proven success of this equipment in the metal finishing industry is your assurance of satisfaction. See your consulting engineer or write for complete information.

INFILCO

The one company offering equipment for all types of water and waste treatment—coagulation, precipitation, sedimentation, filtration, flotation, aeration, ion exchange and biological processes.

INFILCO INC.

912 South Campbell Ave., Tucson, Arizona

Field Offices throughout the United States and in Foreign Countries

5522A

Photo courtesy Mitchell-Bate Co., Waterbury, Conn.

What's being lowered here?

Costs! With Unichrome Coating 218X, of course!

SAVINGS START soon as users lower racks and baskets into Coating 218X. This approved vinyl plastisol provides insulation that lasts phenomenally long. It withstands toughest plating and cleaning cycles, even vapor degreasing cycles. It won't chip, tear, blister . . . won't contaminate baths. Coast to coast, platers know how it cuts maintenance to the bone, saves most time and money in the end.

If you want a nearby, experienced firm specializing in plastisol application to do the job for you, we'll gladly supply names.

PLATING MATERIALS
ORGANIC COATINGS
TIN & TIN CHEMICALS
CERAMIC MATERIALS
RADIOGRAPHIC EQUIPMENT
WELDING SUPPLIES
METALS & ALLOYS
HEAVY MELTING SCRAP

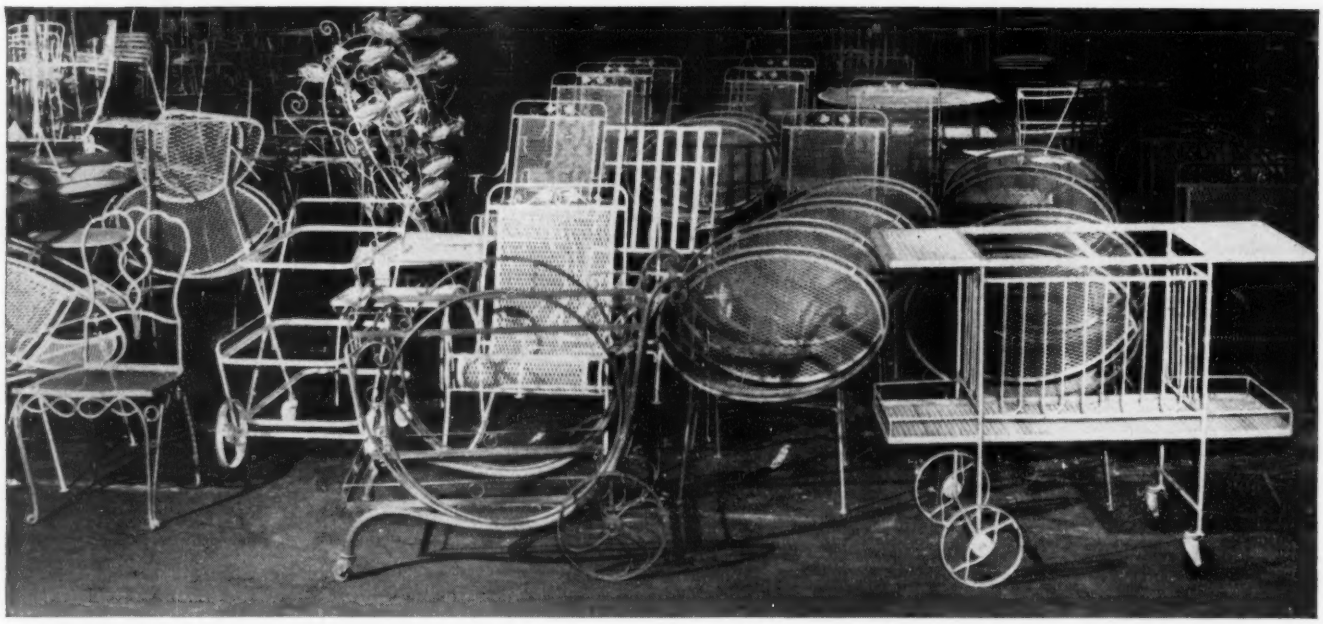
UNICHROME

METAL & THERMIT CORPORATION

GENERAL OFFICES: RAHWAY, NEW JERSEY

Atlanta • Pittsburgh • Detroit • E. Chicago • Los Angeles

In Canada: Metal & Thermit-United Chromium of Canada, Limited, Rexdale, Ont.



Designed by topflight designers at home and abroad, these wrought-iron pieces are backed by Salterini's 35-year reputation and a warranty for at least ten rust-free years of service.

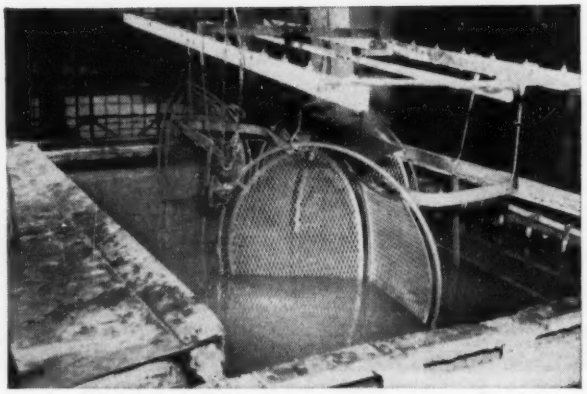
Du Pont zinc-plating process gives Salterini: "... a uniform, close-grained finish for wrought iron"

"DU PONT electroplating processes and chemicals give us a fine-textured, close-grain underseal for our finishes," says George Cooperman, production manager of John B. Salterini Co., Inc., Covington, Va. "They also provide rust- and corrosion-resistant protection that enables us to guarantee unconditionally 'at least 10 years of rust-free service.' "

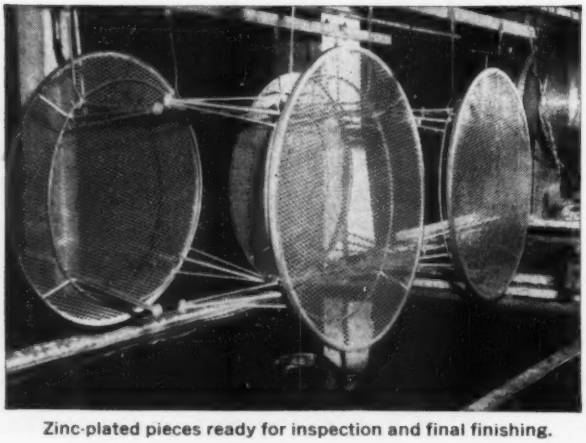
The production features that appeal especially to Salterini are the dependable performance of the bath and its adaptability. They plate 2½ to 4 tons of furniture per shift with a thick corrosion-resistant coating of zinc. Plating current is varied from 60 to 90 amperes per square foot, depending on the work being processed, with consistently good results.

"In the many years we've used the Du Pont zinc-plating process and Du Pont products, including 'Cyanegg' sodium cyanide and zinc cyanide, we've never had a complaint that could be traced to the electroplating."

In the selection of chemicals and processes to meet *your* requirements . . . or for any other information you may require . . . call on the Du Pont technical service organization. Assistance is available through your Du Pont representative or by writing: E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.



Wrought-iron furniture entering plating bath.



Zinc-plated pieces ready for inspection and final finishing.

ELECTROPLATING

chemicals • processes • service

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

7 Big Advantages! in this

This 113' pre-enameling machine was dry cycling four days after delivery. Capacity 100 100-lb. racks per hour. Overall height of lift only 13'.

WAGNER PRECISION AUTOMATIC

INCREASED LOAD CAPACITY

PRACTICAL FLEXIBILITY

LOWER PRODUCTION COSTS

REDUCED MAINTENANCE

100% USER ADJUSTABILITY

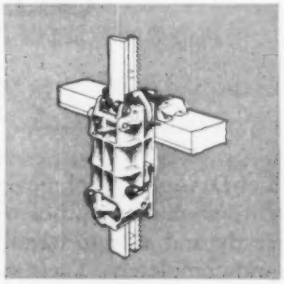
SIMPLIFIED INSTALLATION

IMPROVED PLATING QUALITY

This modular precision electroplating machine is a big subject. Please send for our technical bulletin, learn all the facts, compare—or call the Wagner Man in your area. He'll study your problems and help you achieve better plating at lower costs.

Any day of the week you'll see us lift a 3200 pound automobile with the elevating mechanism of our standard automatic plating machine. That's just to dramatize the dynamic lift capacity of our modular type machine. This excessive capacity simply means that deflection under normal loads is minimum, thus strain on alignment mechanisms is eliminated, wear and downtime is reduced to the vanishing point. Your own personnel—any mechanic—can make precision adjustments of critical transfer members, including the main lift boom, carrier lift angle assemblies and carrier rail support brackets. Maintenance is simple as standard gear racks and pinions are used throughout the entire elevator mechanism (altho capacity can be increased 50% by substituting our heavy duty rack). Hardened guide rollers have positive lubrication—or central lubrication may be installed at low cost.

Here's how you get low cost installation and servicing, even later alterations. All details are interchangeable, precision drilled and machined, preassembled. Our modular design permits easy lengthening or shortening for long term production changes; parts, assemblies, even sections may be replaced. Every part is drilled, reamed, tapped and milled in special co-ordinated fixtures; sections are assembled in giant jigs for fool-proof self-aligning. A single hydraulic power unit interconnected to two hydromotors with micro adjustment of acceleration and deceleration permits work carriers to be lifted, transferred and deposited gently without jarring or loss of parts.



Typical pre-assembled single station elevator housing ready for bolting through jig-drilled holes in main carriage. Note adjustable roller guide brackets.

400 MIDLAND AVE., DETROIT 3, MICHIGAN

CHICAGO • CINCINNATI • CLEVELAND • INDIANAPOLIS • NEW YORK • ROCHESTER • GRAND RAPIDS

Wagner BROTHERS INC.

Shoot your chrome questions at Diamond

Let DIAMOND's technical specialists zero in on your chrome-plating problems. These specialists are ready and able to handle your questions—quickly and completely. Their service is free.

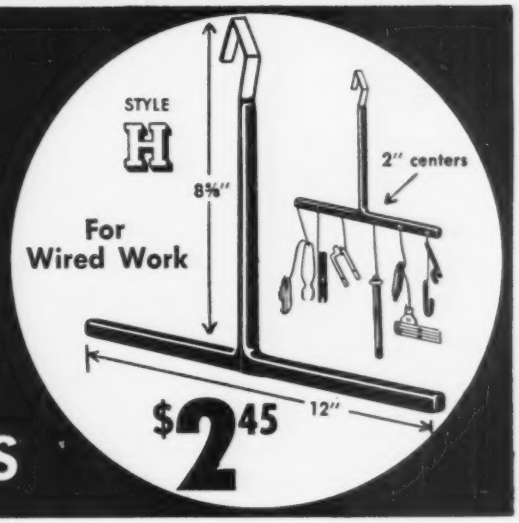
In making chromic acid, DIAMOND controls quality from start to finish. DIAMOND experience begins with importing the chrome ore and making the soda ash. It includes *every step* through production and delivery, right up to standing by your side, if you wish, to help you get top-quality plating results consistently, economically.

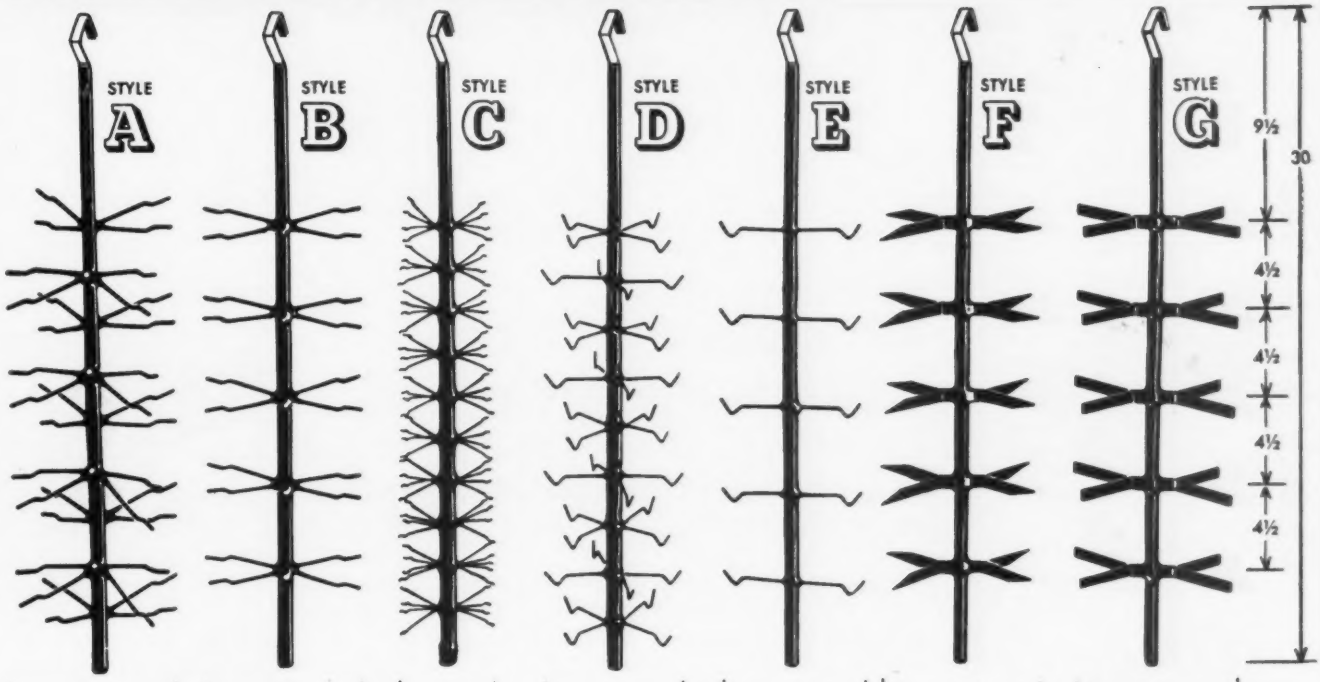
DIAMOND facilities—two chromic acid plants and nine warehouses and sales offices across the country—assure you uninterrupted supply. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

DIAMOND ALKALI CHEMICALS

Diamond Chromic Acid

New, Ready Made Mass-produced *Economy* Plating Racks





Style A	Style B	Style C	Style D	Style E	Style F	Style G
Tips .114 dia. phosphor bronze	Tips .114 dia. phosphor bronze	Tips 1/16" dia. phosphor bronze	Tips 3/32" dia. phosphor bronze	Tips 3/32" dia. phosphor bronze	Tips 1/16x1/2" phosphor bronze	Tips 1/16x1/2" phosphor bronze
$5.78	$4.77	$6.00	$5.83	$4.42	$5.84	$5.69

Add $1.50 packing charge on orders for less than 12 racks. Prices F.O.B. Chicago.

Made of BEST materials obtainable

SPINES are one-piece solid copper, round cornered and sand-blasted for perfect adhesion of the insulation.

RIGID CONSTRUCTION. The phosphor bronze tips are riveted to the spine, then soldered where necessary for complete rigidity. **Do not confuse with Thinker Boy construction—the tips are not replaceable.**

COATED AFTER ASSEMBLY with the same Universal Plastic used on BELKE Custom-Built and Thinker Boy Racks—withstand all cleaning and plating cycles.

The low prices are made possible through economies of mass production. No specifications can be changed at these prices except in mass production quantities. Prices subject to change with changes in costs.

Place your order early

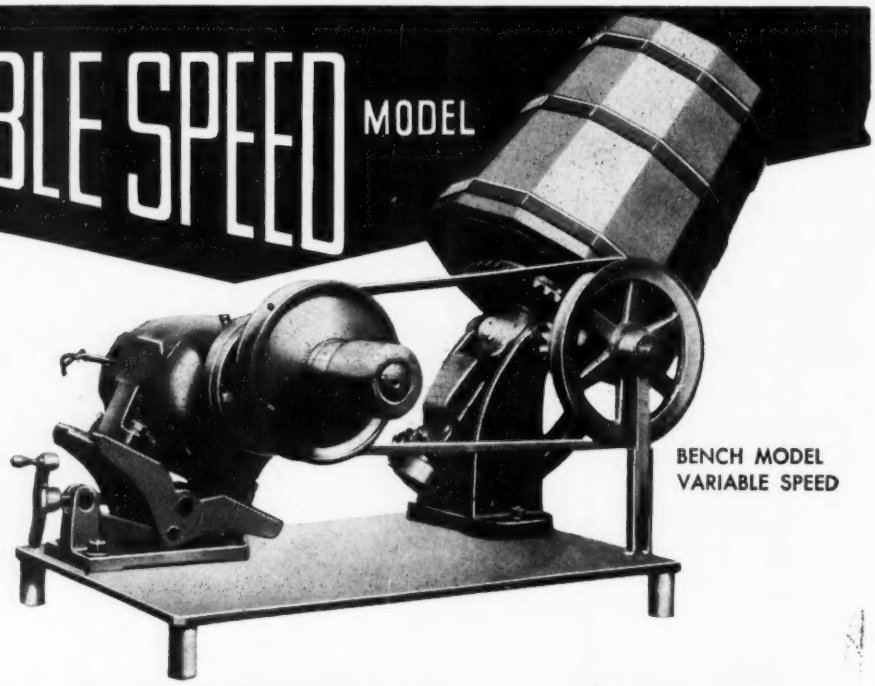
Economy Racks will be stocked for immediate shipment as soon as production catches up with the demand. In the meantime please order in advance of your requirements and avoid disappointment.

Belke Manufacturing Company
947 N. Cicero Ave., Chicago 51
EVERYTHING FOR PLATING PLANTS

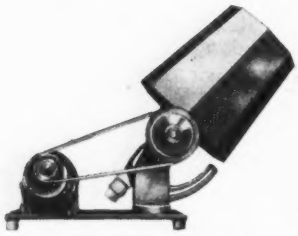
You Expect Top Quality From Belke . . . . And You Get It!

INVESTIGATE THIS TIME-SAVING

VARIABLE SPEED MODEL



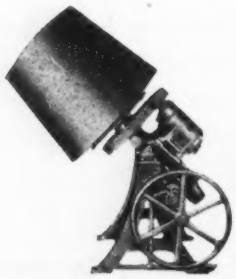
BENCH MODEL
VARIABLE SPEED



Bench-Type Single Speed

No. 5—Single Speed

No. 5A—Single Speed



No. 6—Single Speed

Note Carefully These IMPORTANT POINTS

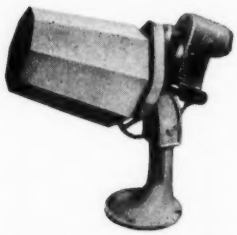
Barrels can be filled with parts or abrasive—*while running.*

Work can be watched — samples removed for inspection — *while running.*

Angle can be changed for best abrasive or polishing action — *while running.*

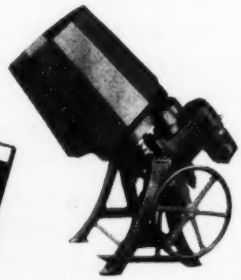
Barrels can be emptied by tilting to pouring position — *while running.*

Barrels are made in various sizes, shapes, and materials. They are easily replaced.



No. 5—Variable Speed

No. 5A—Variable Speed



No. 6—Variable Speed

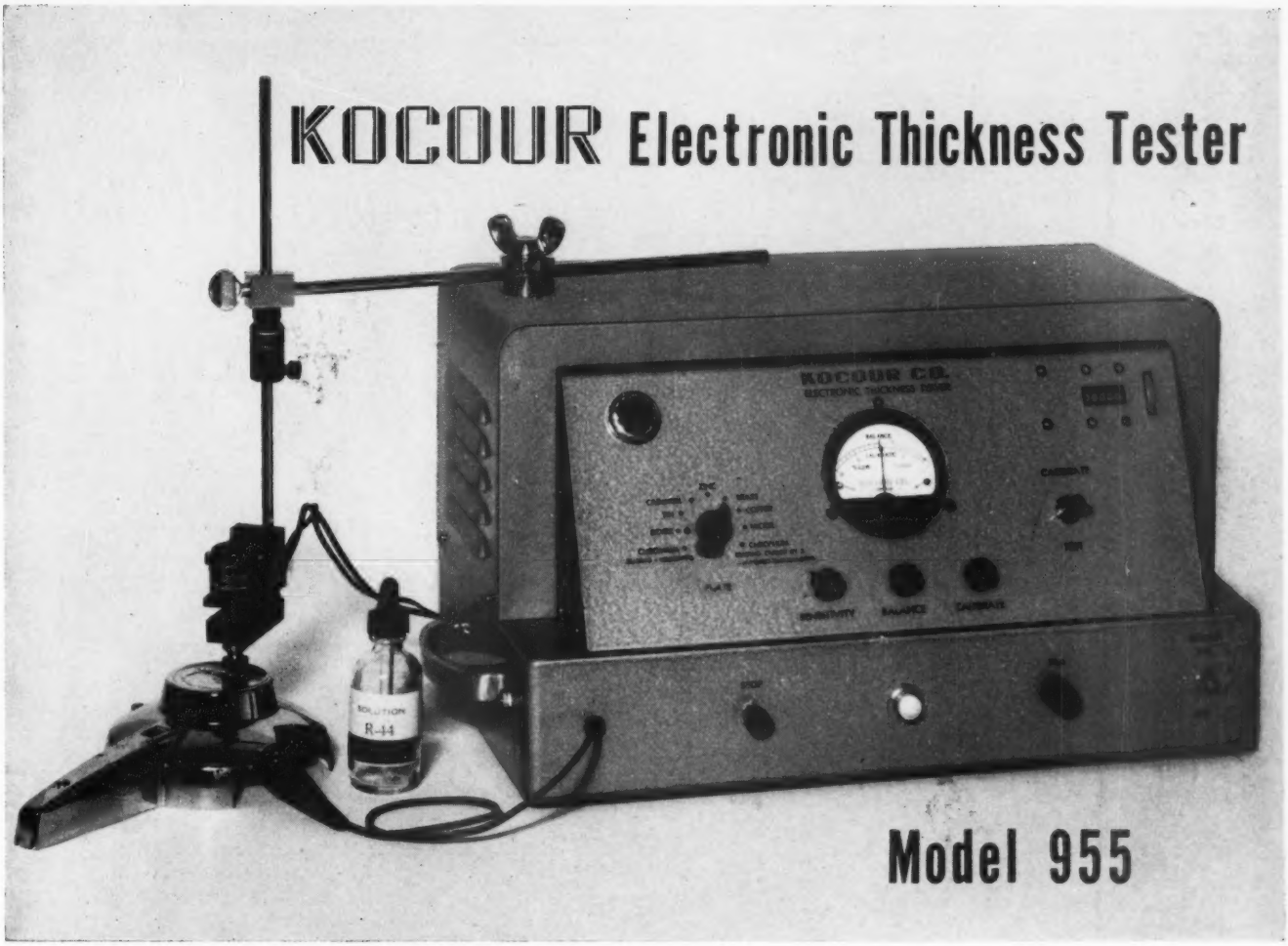
If You're a Tumbler, Send for This NEW CATALOG

THE HENDERSON BROS. COMPANY

"The Tumbling Barrel People"

136 SOUTH LEONARD STREET
WATERBURY, CONNECTICUT

SINCE 1880 . . DESIGNERS AND BUILDERS OF TUMBLING BARREL EQUIPMENT



A NEW MODEL

To solve your plating thickness problems!

The importance of thickness testing cannot be over-estimated. However, the accuracy of a thickness test can be no better than the accuracy of the method used. Can you rely with confidence on the method you are now using? To what degree does the "human element" influence the accuracy of the results?

The Kocour Electronic Thickness Tester Model 955 will give you readings with an accuracy of 90-95%. Furthermore, with the new Calibration feature used in conjunction with Kocour Thickness Standards, you can not only check the accuracy, but calibrate the instrument to correct slightly high or low readings. A plating selector switch indicates all of the commonly plated metals which can be tested on various basis metals and materials . . . human error is virtually eliminated by the automatic operation . . . readings are direct . . . results are reproducible . . . average test requires about one minute.

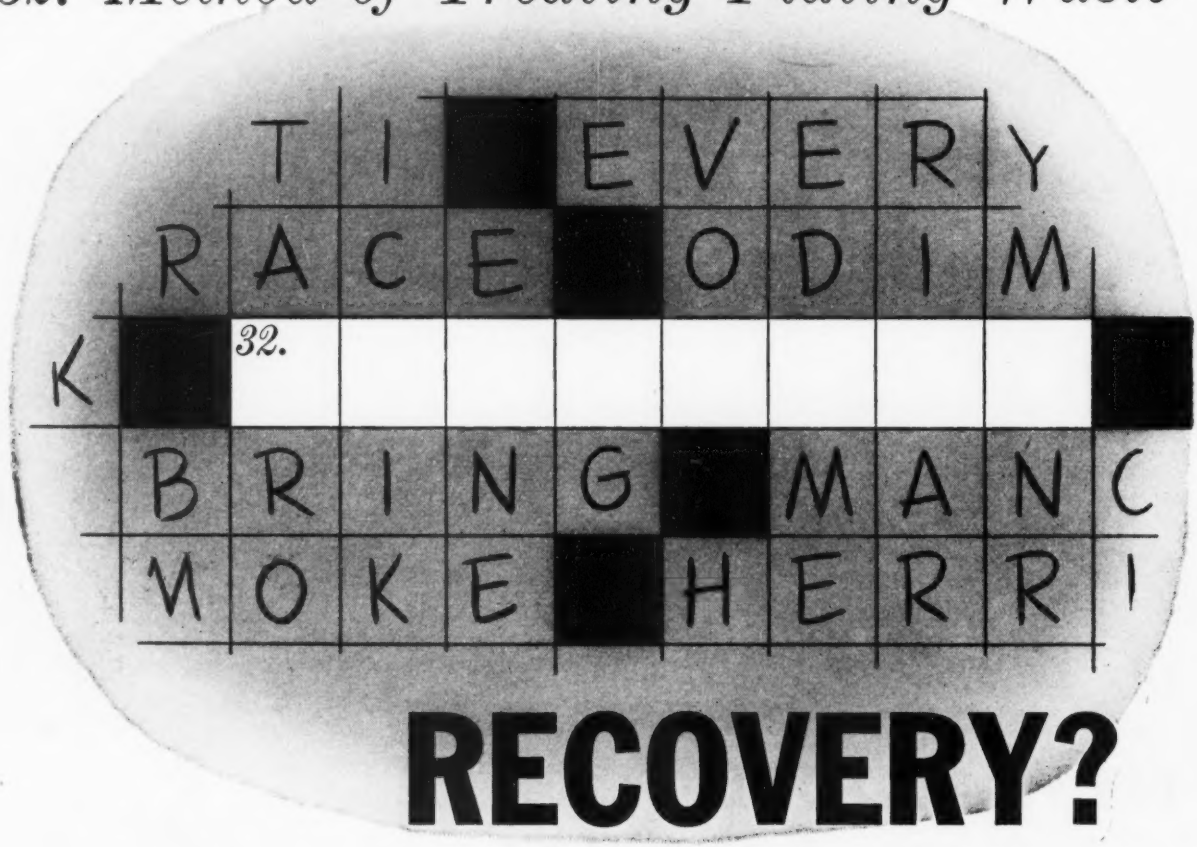
These features add up to a dependable instrument which will solve your problems efficiently, accurately and quickly. Write for further details today!

Ask for a demonstration or 15-day Free Trial.

KOCOUR CO.
Pioneers in Control for the Plating Industry

4802 S. ST. LOUIS AVE.
CHICAGO 32, ILLINOIS

32. *Method of Treating Plating Waste*



RECOVERY?
DISPOSAL?

There is no one process that will solve all plating waste problems. Experience has shown staff and consulting engineers that the correct solution can be obtained only by thoroughly evaluating all the factors in each case.

Whether the answer is recovery, disposal or a combination of both, Graver has complete equipment to do the job. Graver's 50 years of liquid treatment experience has resulted in equipment of advanced designs and engineered flexibility to suit individual requirements.

WRITE FOR TECHNICAL ARTICLE AND BULLETINS:
T-136: Plating Waste Solutions; Recovery or Disposal
WC-103A: Reactivators • WC-111: Ion Exchangers

GRAVER®

Industrial Waste Treatment Dept: W-211
GRAVER WATER CONDITIONING CO.
Division of Graver Tank & Mfg. Co., Inc.
216 West 14th Street, New York 11, N. Y.

Formulators prefer Dow Alkali for efficient metal cleaning

Formulators with know-how start with Dow Alkali as the base in their top-quality metal cleaning compounds. Why? Because Dow Alkali delivers the high cleaning power they need. Formulations containing Dow Caustic Soda Flake and Dow Sodium Orthosilicate clean fast and thoroughly, leave metal parts and products free of dirt, grime and grease. Many plants have cut operating costs and increased efficiency by switching to a topnotch alkali cleaner made with Dow products. Why not give it a try? THE DOW CHEMICAL COMPANY, Midland, Michigan, Department AL607K.

YOU CAN DEPEND ON DOW

Colson adds More Proof

Barrel cuts plating time 80%

PLATING COSTS DOWN . . . from 80 hours a week to 16. That's what Colson gains by using perforated tumbling barrels in plating. It's Colson's new way of plating caster parts with cadmium and zinc. It pares costs 45 to 66%.

New way — Five perforated, hexagon welded plastic barrels replace baskets. Each barrel is suspended in the tanks by a heavy steel bracket and is rotated by a drive unit at 2½ rpm.— fast enough to give excellent coverage but not so fast that parts are nicked. An electric chain hoist moves barrels from tank to tank.

Old way — Operation was a bottleneck. Parts were loaded into baskets, then dipped in a series of six tanks. Neither the work nor the solution was agitated, so coverage wasn't uniform. Repeat treatment was needed often.

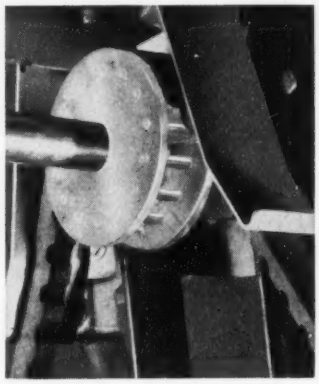
(above) Reprinted courtesy Factory Management and Maintenance, July, 1956, Page 94, "Putting Big-Time Ideas to Work" (at Colson Corp., Elyria, Ohio)

that G-S means Greater Savings

Colson Cuts Plating Time, Costs and Improves Quality with New G-S Belt-Drive Barrels

"When a production man can see a way to save manhours, and money while producing a better product, he's always interested" said Jack Davis, Plant Manager of Colson Corp., Elyria, Ohio. "We changed over our plating line to G-S Barrels for cadmium and zinc. Now, after 3 years, our figures show manhour savings, and practically no maintenance costs or replacement of equipment.

Colson typical of all G-S installations! . . . G-S "Cogged-V-Belt" Drive Plating Barrels offer platers larger loads, faster, better plating at higher current densities. They deliver "through cycle" service, and longer equipment life with no down-time. No other equipment can match G-S feature-for-feature at **any** price. (U. S. Pat. 2,562,084. Other Pats. Applied For.) That's why G-S equipped platers are getting the biggest returns per investment in the industry. Check into the G-S Conversion Plan for **your** plant. It costs **less** than you think, and will **pay for itself in savings.**



SAVE 100%

gear maintenance

Eliminated: cylinder end drive gear, idler gear, pinion gear, 3 bearings.

No gears or bearings in solution.

"The Belt-Drive with the Gear Grip" — Exclusive G-S cogged V-belt and cogged drive-pulley, constant meshed for positive power transmission without gears. Can't slip, creep, vary speed. Cogged-V-Belts steel tensile members won't stretch. "Locking U-Hubs" — danglers angled down through hubs won't ride up on load. Quick, easy changing of cylinder and danglers saves hours. Adjustable Bearings, Floating End Plates for constant contact. Total cylinder immersion prevents explosions. Cylinders of H-T Sincolite or Tempron (hard rubber) fusion-welded, heavy-ribbed construction. See more features than ever before offered. Send for Bulletin GSB 101.

The G. S. Equipment Co.

15585 Brookpark Road Cleveland 11, Ohio

CLearwater 2-4774

WANT A BETTER ALUMINUM CLEANER FOR USE IN SPRAY WASHERS?

get the newest and best ...Wyandotte Spray-Altrex!

Here is a mild, safe cleaner, with heavy-duty action, especially developed by Wyandotte for spray-washing aluminum — yet, it cleans most other metals, too. Easy to control, it works well in all kinds of water; cleans without foaming.

Wyandotte SPRAY-ALTREX is 100% soluble, has long life; it produces bright, clean surfaces. It has low surface and interfacial tensions; will not attack aluminum.

SPRAY-ALTREX is just one of the many valuable products Wyandotte produces for the metal-finishing industry. Others include: F.S. for steel electrocleaning, LECTRITE-NF for brass and other nonferrous-metal electrocleaning, and W.L.G.* for steel and brass soak cleaning.

ADVANTAGES OF SPRAY-ALTREX:

- **Inhibited** — will not attack aluminum alloys in normal recommended concentrations.
- **Exceptional detergency** for removal of shop dirt, fabricating oils in spray washers. Effectively removes marking inks on aluminum.
- **High soil-suspending properties.**
- **Free rinsing.**
- **Non-foaming** — can be used in high-pressure washers.
- **Outstanding life.**
- **100% soluble.**
- **Can be used in hard or soft water.**

Our competent service representatives can advise you on the best metal-processing methods. So, get in touch with us today. Fill out and mail coupon for complete details. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Also Los Nietos, California. Offices in principal cities.*

*REG. U.S. PAT. OFF.

Wyandotte CHEMICALS

J. B. FORD DIVISION

THE BEST IN CHEMICAL PRODUCTS FOR METAL FINISHING

* **MAIL COUPON TODAY**

Wyandotte Chemicals Corporation
Dept. 2484
Wyandotte, Michigan

Please send me more information on the following products:

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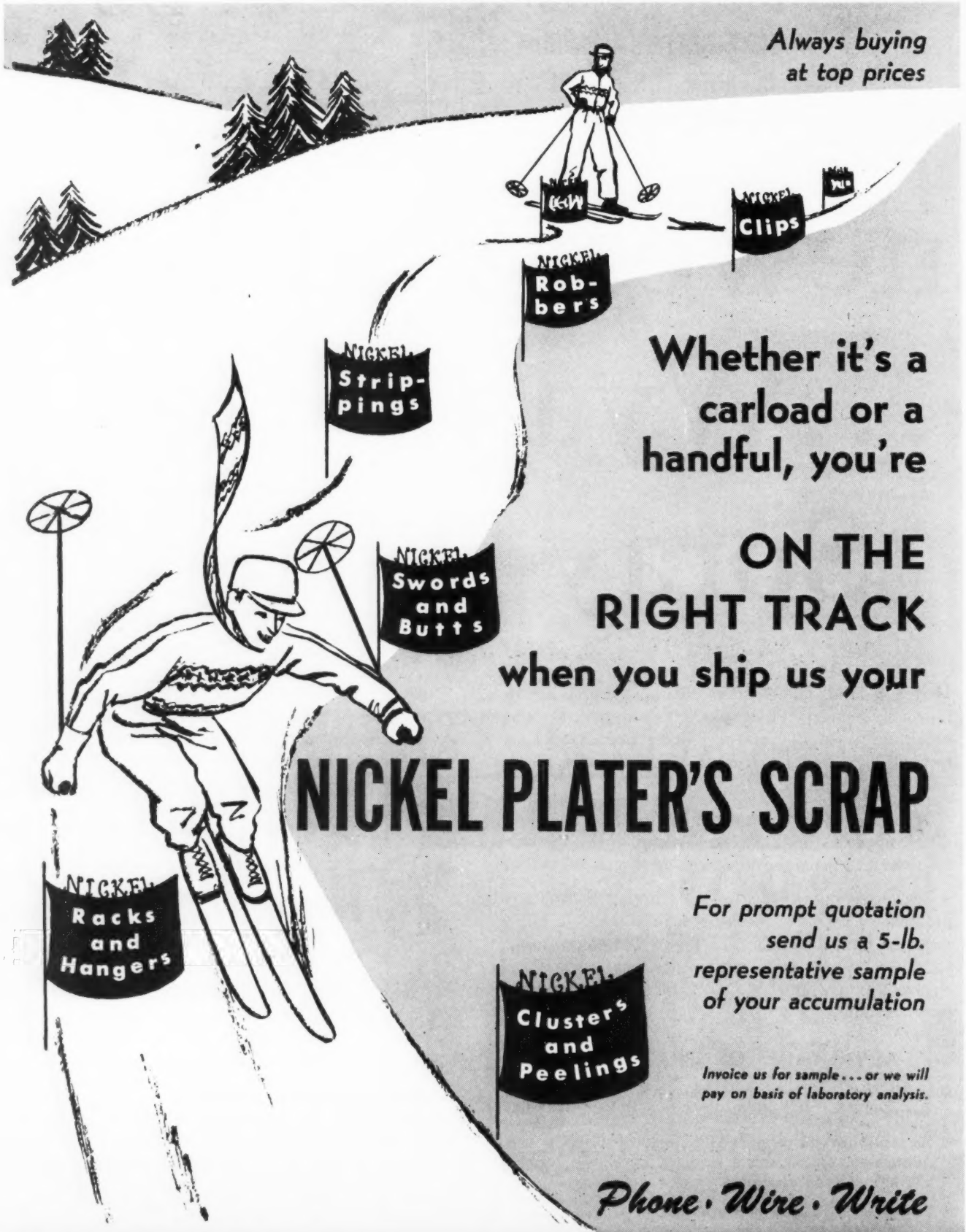
Name_____ Title_____

Firm_____

Address_____

City_____ Zone_____ State_____



Always buying at top prices

Whether it's a carload or a handful, you're

ON THE RIGHT TRACK when you ship us your

NICKEL PLATER'S SCRAP

For prompt quotation send us a 5-lb. representative sample of your accumulation

Invoice us for sample... or we will pay on basis of laboratory analysis.

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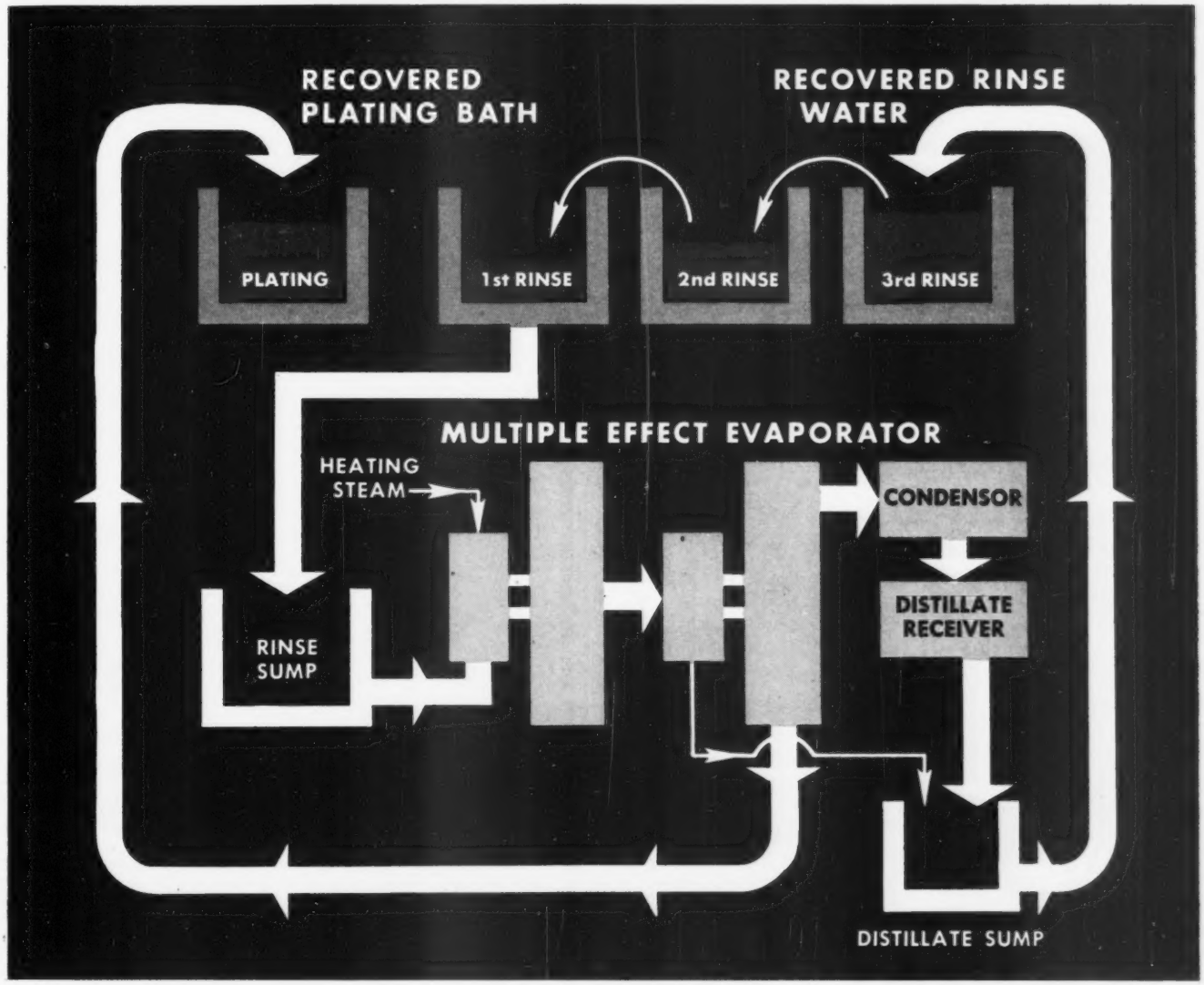

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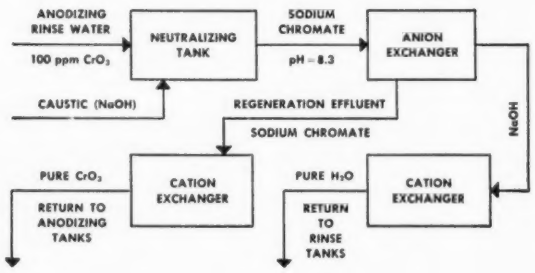

RECOVERY OF CHROMIC ACID FROM ANODIZING RINSE WATER

The block diagram above indicates one method of using ionXchange to save money, in the plating rooms of a large automobile plant, by recovering the chromic acid from the rinse tanks of anodizing operations. The cost of equipment was much less than the cost of a disposal plant, and the savings through recovery were substantial enough to make the investment a very profitable one.

REMOVAL OF ALUMINUM FROM ANODIZING BATH

A secondary purpose for one part of the same installation was the removal of aluminum from the anodizing baths. When the concentration of aluminum in any anodizing tank rose to nearly 1 g. per liter, that tank was cycled through the cation exchanger and the aluminum removed, thus saving over $250 a week compared with partial dumping. *For details on this and many other money-saving applications of ILLCO-WAY ionXchange, write us or consult your Illinois Water Treatment Company representative.*

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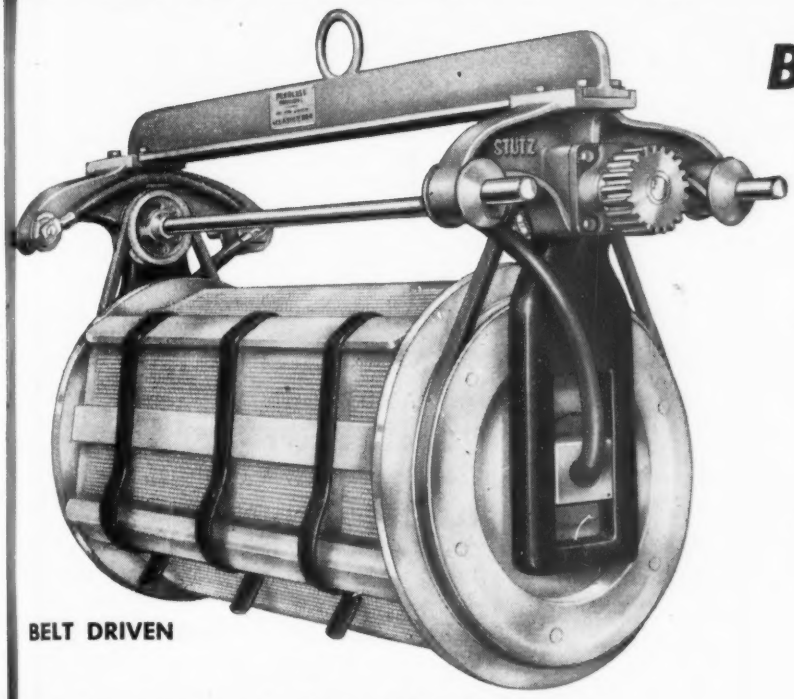

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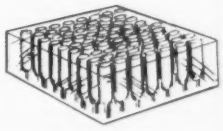
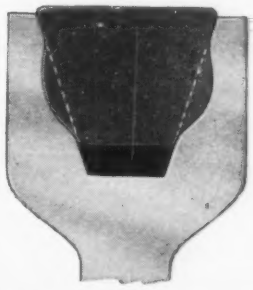
Greater Current Carrying Capacity Which Lowers Plating Time and Cost . . .

Stutz Belt Drive complete cycle Plating Barrel. This unit incorporates a cylinder of one piece Plexiglas construction, suspended and rotated by two V belts and arranged between cast steel guide frames protected with 1/16" thick special vulcanized hard rubber. For smooth barrel operation, saddle horns are located on 15" centers, 4 provided for maximum current. Cylinder door is heavily reinforced and is locked with vinyl chloride covered spring steel bung clamps. Cathode contactors are dangler type. These units made to fit most makes of plating tanks and furnished also with motor drives mounted directly on cylinder superstructure. Standard sizes 14"x30" and 14"x36" (I.D.) 13 addi- round on 3/16" centers. Patented dual hole for processing of extremely small parts available.



Specially designed counter pulleys of monel metal with deep dimples for positive grip against belt face.



This shows the belt expanding into the dimples of the driving pulleys. This action provides positive pull with no abrasion to the belt whatsoever.

Patent Pending

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- The Stutz Portable Barrel is made in 2 standard sizes with cylinders having inside dimensions of 6" x 12" and 8" x 18", I.D., and smaller upon application. Standard openings are 3/32". Smaller or larger openings can be furnished as required.
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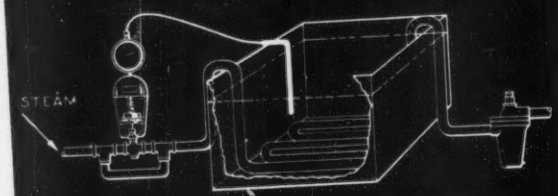

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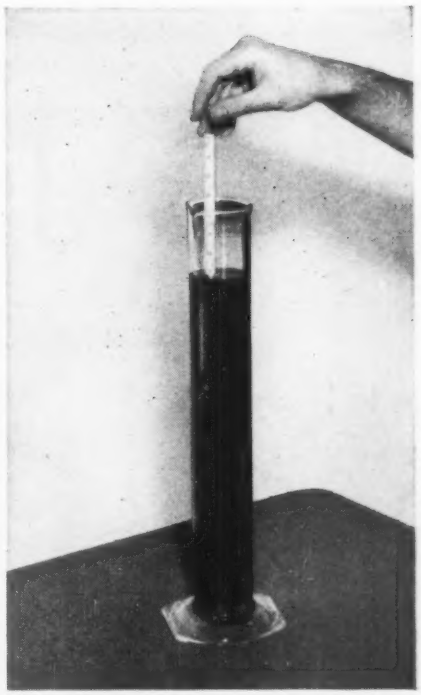
Remarkable feature of SRHS Solutions is the *self regulation* of important chemical constituents. In effect, this means *automated control*. Automatically kept in optimum balance, the bath assures good results, saves manhours and money.



A simple hydrometer check, taken at periodic intervals, indicates when additional SRHS Compound is needed.

OPERATION IS EASIER

Unlike plating with ordinary chromium, there's no need to make lengthy analyses of samples of the SRHS solution; no need to lose time determining additions to the bath to restore proper balance for good plating.

Instead, the unique formula of the SRHS compound permits a reserve of chemical to be available in the tank ready to dissolve automatically in the right amount needed to replace losses. A simple hydrometer reading tells when to add more SRHS Compound.

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Through this *automated* control of plating balance, the numerous cost-cutting benefits of SRHS are achieved to the fullest. Plants plate up to twice as fast as with ordinary chromium . . . save on power consumption . . . gain more production capacity without extra equipment . . . and reduce the "burning" and "missing" that account for so many rejects.

For details, send for Bulletin SRHS-3, or for a Metal & Thermit engineer.

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Tantalum is an acid-proof, corrosion-proof metal comparable to steel in strength. It is available in Unichrome U-bend and "hairpin"-bend coils, also. These coils can be used for both heating and cooling, outlast ordinary coils many times over, cutting downtime and costs. Send for more information.

NEW CYLINDRICAL ANODE EXPOSES LARGER EFFECTIVE SURFACE

A new style of Unichrome round anode for chromium plating features a ribbed perimeter. The ribs give 75 current throwing edges or "points" in the 2" diameter anode, and 55 edges in the 1½" anode.

This multipoint ribbed anode prevents trivalent chromium build-up in solutions where cathode area is large. It offers all the advantages of the original smooth round Unichrome Anode. These include longer life, better current distribution, high conductivity, resistance to warping. Send for data sheet RRA-1.

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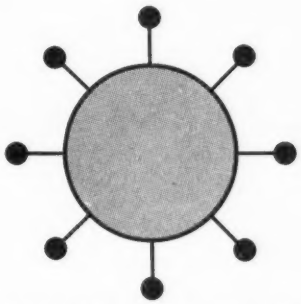
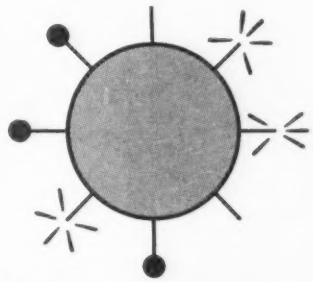
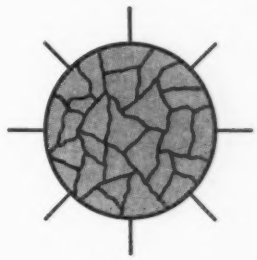


1. The trichlorethylene you use for degreasing metal is protected by a stabilizer (small circles) against heat, light, air, moisture, acids and active metals like aluminum.

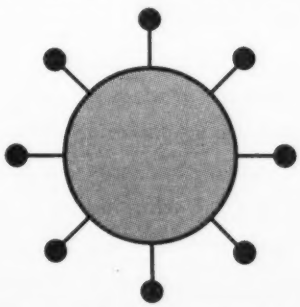


2. Ordinary stabilizers wear out or become depleted during normal use. With some solvents, you have to titrate your bath frequently, and may have to add fresh stabilizer.

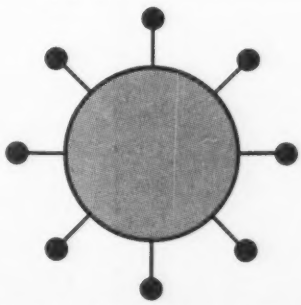


3. When stabilizer wears out, your degreaser doesn't function properly. It may even stain metal parts instead of cleaning them. You have to clean out the "sour" bath.

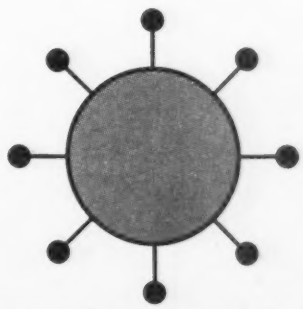
Use Nialk® TRICHLORethylene and get psp ... like this



1. You get full-time protection with NIALK stabilizer's unique action. Notice the difference between the next two diagrams and those above.



2. NIALK stabilizer does not wear out during normal use. It's always there, working. You never have to titrate your bath, or add fresh stabilizer.



3. Even after repeated distillations, you still have complete protection. All the stabilizer is active. Only NIALK has this **psp**—permanent STAYING power.

Why you pay less to degrease with Nialk® TRICHLORethylene

The drawings above demonstrate a difference—a big, cost-cutting difference—between NIALK TRICHLORethylene and conventional vapor-degreasing solvents.

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psp means cheaper degreasing

You don't have to clean out your degreaser nearly so often with NIALK TRICHLORethylene. You can degrease many more parts between cleanouts.

The NIALK stabilizer actively retards formation of degradation products in your degreaser—cleanouts are easier, faster.

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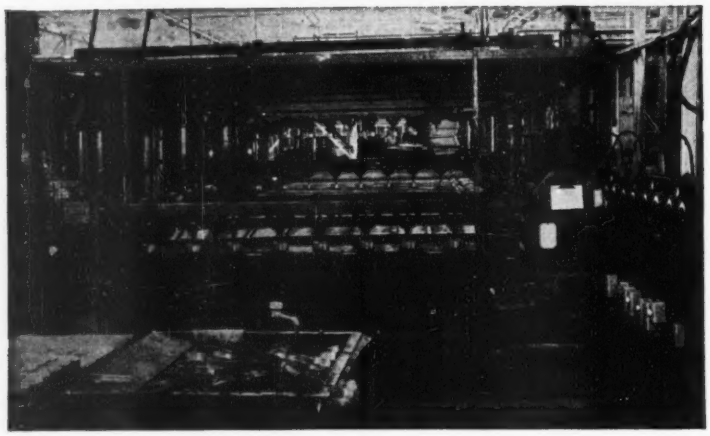

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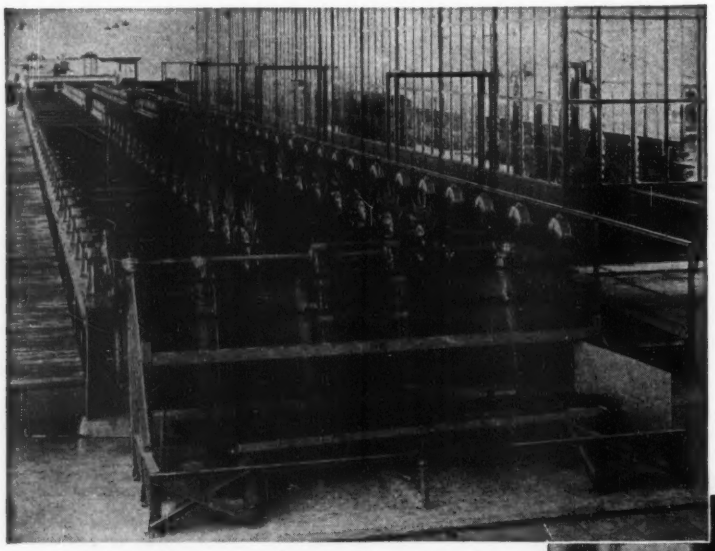

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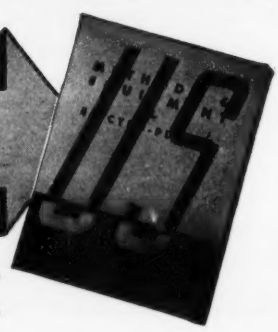

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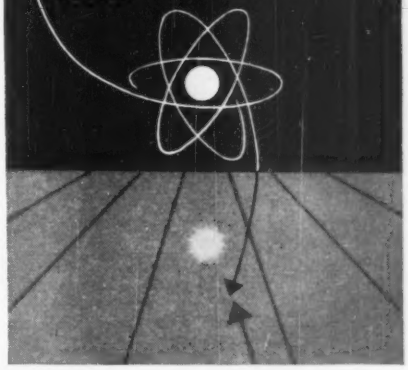

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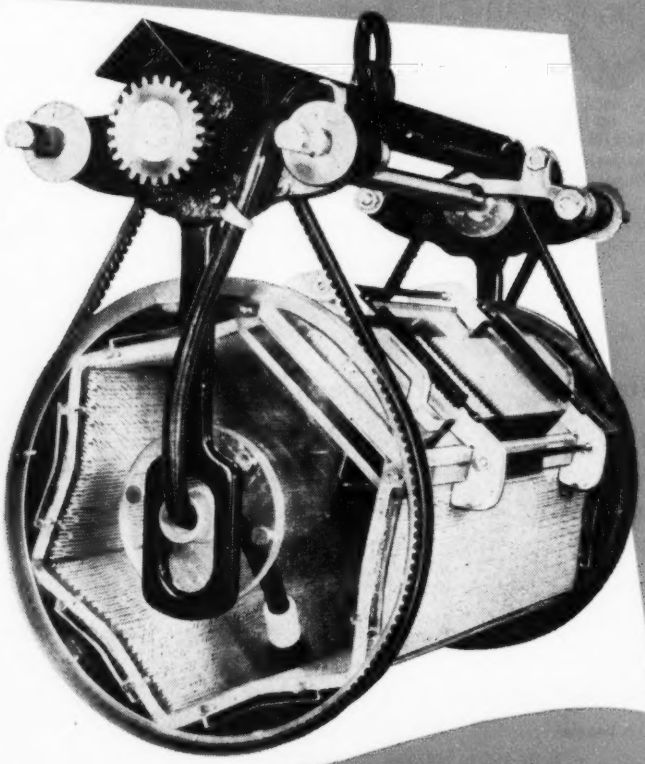

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ESTABLISHED 1903 • VOLUME 55 • NUMBER 2 • FEBRUARY, 1957

Not an Expedient, But a Trend

Technical progress is usually marked by periods of relative inertia, disturbed by occasional flurries of excitement over a new process. The new development enjoys its day in the sun and, after trial and due consideration of the pros and cons, is then accepted or rejected by industry. If found to be commercial, it is fitted into its proper niche in the production cycle, where it performs its intended task as if it always belonged.

One might note that most of these developments arise as a result of interference with the established order, such as rapidly expanding production, economic conditions, and shortages. A classic example is the emergence of photoengraving, which received its impetus from the burgeoning of journalism, the lack of sufficient artists qualified to prepare hand engravings, and the expense of the hand process. Because of these conditions a process, well known but formerly considered inapplicable, overnight takes on a new importance and is modified, if necessary, to fit the new requirements. A case in point is anodized aluminum in the automobile industry which, despite comments to the contrary, has also felt the effects of the nickel shortage.

A recent publication listed seventeen instances in which anodized aluminum replaced chromium plate on the 1957 cars, with complete acceptance by the consuming public. This, we believe, is a trend, not a temporary expedient, and should give pause for contemplation by many manufacturers who feel that without nickel-chromium plate their products would be unmarketable. Of course, the poor plating quality with which the consumer has had to put up at every turn in recent years probably has conditioned him toward the welcome acceptance of any promising substitute. On the other hand, he already has been favorably impressed with the wear and corrosion resistance of the numerous anodized aluminum products which are found in every household and many structures.

We doubt whether this finish will, in the foreseeable future, replace nickel-chromium plate on a set of bumpers, but it has an enormous unrealized potential which will not be affected by any increased availability of nickel. Were it not for the necessity of replacing the low voltage generating equipment presently employed for plating, anodizing would surely have been more widely substituted, since the average plating installation otherwise could be converted without too much difficulty. If someone should come up soon with an anodizing process using 6-8 volts d.c., we will really see action.

The auto industry is leading the way, as it has done before with other new processes. Its progressiveness will make it easier to overcome any remaining resistance on the part of producers and consumers alike, for which it deserves well-merited praise.

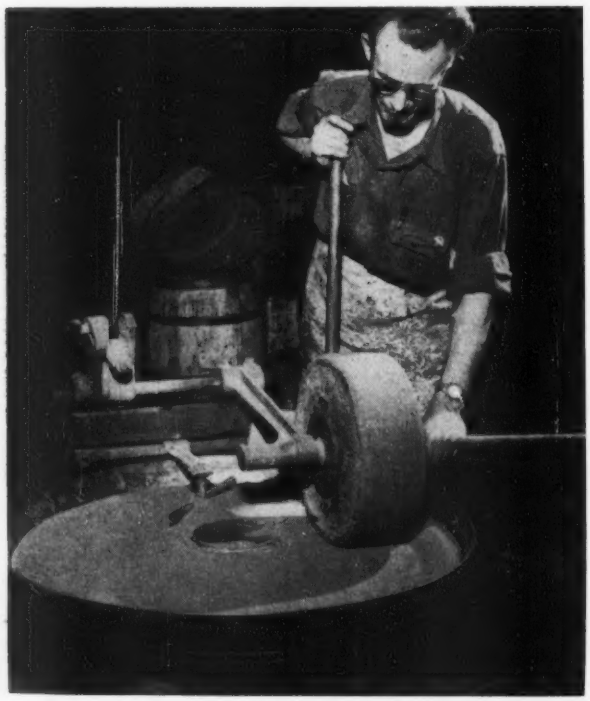
Nathaniel Hall

Metal Polishing with Set-Up Wheels

By R. S. Burt, *Abrasive Grain Specialist, Electro-Minerals Division, The Carborundum Company, Niagara Falls, N. Y.*

METAL polishing is the production of uniform surfaces of desired characteristics by removal of metal through abrasion. Generally, the abrasives employed in metal polishing are attached to the working surface of the polishing wheel by using a suitable adhesive. Metal polishing operations are, in some instances, preceded by one or more machining operations. Surfaces which have been generated by metal polishing are characterized by the parallel lines which remain after completion of the polishing operation. Metal polishing is concerned primarily with surface refinement and, as differentiated from precision grinding, is not a method suitable for generation or retention of geometric or dimensional accuracy.

The methods and procedures followed in metal polishing have not attained the degree of standardization which would permit the classification of metal polishing as a science rather than as an art. The sequence of operations required to produce a surface of specified characteristics on a given type of metal will vary greatly in different polishing rooms and may also vary to some extent among operators in a single polishing room. Among the reasons for variations in polishing procedures are inconsistency in quality of adhesives and abrasives employed, and variations in available equipment. Under similar operating conditions, and using abrasives and adhesives of standard quality, one group of polishers should be able to produce results as satisfactorily as any other group of polishers using similar equipment and materials, provided that the skill of the operators is equal. However, in most polishing roms, the sequence of operations is based on the experience of the polishing supervisor and is not always the best or most economical method which may be used on the material being polished.



Setting-up or coating wheel with abrasive grains after glue or cold cement has been applied to wheel. Most large size set-up wheels are coated in this manner.

Wheels used in metal polishing are made from many different materials, some of the more common of which are muslin, canvas, felt, bull-neck leather, sheepskin, and leather covered wood. Selection of the proper type of polishing wheel for a given operation will be largely dependent upon the degree of resiliency required in the wheel. The diameter and thickness of the wheel is governed by the size and shape of the article to be polished. Polishing wheel manufacturers will usually assist in selection of the proper wheel type for the operation to be performed.

Types of Adhesives

The rate of rotation of the polishing wheel should be governed both by the diameter of the wheel and the type of adhesive used in setting up the wheel. The two types of adhesive most commonly used for polishing wheel set-up are hide glue and cold cements. Wheels set up with hide glue perform most efficiently at surface speeds of 6500 to 7500 S.F.P.M. Higher speeds tend to soften the glue and allow the abrasive particles to be torn from the working surfaces. Wheels which have been set up with cold cements may be operated at speeds as high as 10,000 S.F.P.M. without reduction of efficiency. The maximum speeds mentioned above must, in some instances, be reduced because of the characteristics of the articles being polished. Articles which are fabricated from thin sheet metal may tend to become discolored and altered in temper when high surface speeds are employed during the polishing operation, and distortion may also occur. When the article to be polished is made from a metal of relatively low melting point, such as zinc die-cast metal, lower surface speeds are necessary to prevent melting of the surface metal by frictional heat. The optimum operating speeds in such cases can best be determined by experimentation.

At one time, hide glue was almost universally used as the adhesive for polishing wheel set up, but it has been replaced to some extent, in recent years, by cold cements. Each of these adhesive types has definite advantages and limitations. A wheel which has been set up with hide glue will have greater resiliency than a similar wheel which has been set up with cold cement, and will also produce a finer scratch pattern for a

given abrasive particle size. Polishing wheel cements have several advantages over glue, among which are — simplicity of preparation, since they require no heating, and considerably greater production per wheel set-up, since the cements lose little, if any, of their adhesive properties when subjected to frictional heat. Generally, cold cements are preferred for polishing operations 150 grit and coarser because of their greater production efficiency and comparatively fast rate of cut of such wheels. Hide glue is preferred for operations using abrasives 180 grit and finer because of the finer finish attainable.

Glue for wheel set-up should be a good grade of hide glue, and should have a viscosity rating of not less than 115 millipoises. In most cases, the viscosity rating will be supplied by the glue manufacturer upon request. Ground glue is easily prepared and is generally used in preference to either cake or flake glue. The glue and water mixture will vary with the abrasive particle size to be used in the set up. A mixture of glue and water of equal parts by weight is recommended for abrasives 36 grit and coarser. The glue concentration is lessened for finer abrasives, and for abrasives of 220 to 240 grit, a mixture of one part of glue to three parts of water by weight is recommended. The glue and water should always be weighed since the weight to volume of ground glue will vary according to the fineness to which the glue has been ground.

In preparing the glue for use, a quantity of water, somewhat less than the amount required in the finished mixture, is added to the glue and the glue should then be allowed to soak for a period of approximately one hour. After the soaking period, the glue-water mixture should be heated to a temperature of approximately 140°F. at which point the mixture will liquefy. A sufficient quantity of lukewarm water should then be stirred into the liquefied glue-water mixture to produce the desired concentration. The temperature of the prepared glue should not be permitted to rise above 150°F. as higher temperatures cause glue to lose a portion of its strength. Reheating or continuous heating of prepared glue over a period of time in excess of four hours will also cause the glue to become reduced in strength. A quantity of glue sufficient for not more than four hours requirements should be prepared at one time for best results. To prevent bacterial decay, the glue pot should be washed and scalded at the end of each working day.

Abrasive Materials

The abrasive materials most frequently employed for set-up wheel polishing are fused aluminum oxide and natural emery. Prior to the advent of manufactured aluminum oxide abrasive, emery was the abrasive most commonly used for metal polishing. As found in nature, emery consists of from 10% to 70% of impure corundum particles imbedded in a matrix of magnetite or hematite. The matrix materials have no function in the abrading action of the emery and tend to modify the cut of the corundum particles. Because of the great variation in chemical and physical properties of natural emery, and because of its comparatively slow rate of cut and low production efficiency, emery has been almost entirely replaced by manufactured abrasives in set-up wheel polishing. Some polishers prefer

Off-hand grinding and polishing of wrench forging using a canvas set-up wheel.

emery over manufactured abrasives for fine grit polishing operations because, for a given particle size, the emery will produce a finer scratch pattern than fused aluminum oxide. However, a finish of equally fine texture can usually be accomplished faster and more economically by using an aluminum oxide abrasive of slightly finer particle size.

Fused aluminum oxide abrasives for metal polishing are manufactured by processing natural bauxite in an electric furnace, the resultant product consisting of approximately 95% aluminum oxide (Al_2O_3). Through exercise of exacting controls over the materials entering the electric furnace, and by carefully controlling the crushing and grading operations which follow the electric fusion, an abrasive is produced which has the desired qualities of angularity, toughness, uniformity of particle size, and granule surfaces frequently modified by etching or coating to provide maximum adhesion to binders.

Successful metal polishing depends, to a great extent, on uniformity of particle size of the abrasive materials employed. Coarse or oversize particles cause deep scratches which can only be removed with difficulty in subsequent operations, and an excess of fine particles will slow down production. Therefore, accurate grading is of prime importance.

The shape of the abrasive particle has an important bearing on its production efficiency. An electric furnace abrasive, when crushed, contains a percentage of weak particles consisting of flats and plates, which are thin, and slivers, which are long and narrow. These flats and slivers have little or no cutting value on a polishing wheel and are usually eliminated during the grading operations which follow the crushing of the abrasive. Experience has shown that slight variations in abrasive particle shape are necessary for maximum

efficiency in the polishing of different metals. Steel and other metals of high tensile strength require an abrasive consisting of comparatively tough, blocky particles, whereas an extremely sharp and angular abrasive is best suited to the polishing of bronze. aluminum, and other metals of low tensile strength.

Preparation of Wheel for Set-Up

A new polishing wheel should be dressed so that it will run in truth before it is ready for set-up. The truing may be accomplished by mounting the wheel on the polishing lathe arbor and dressing the surface while the wheel is being rotated. An edged tool made from a file or an abrasive stick is generally used for the dressing operation. A polishing wheel should be marked with an arrow so that it will always be operated in the same direction of rotation.

The procedure required to condition a used polishing wheel for set-up will vary with the condition of the wheel. If the abrasive remaining on the wheel is loose, or if the wheel is not running in truth, the abrasive should be entirely removed by using an abrasive stick or the end of a piece of metal pipe. The wheel should be then dressed so that it will be in truth.

Tallow, stearic acid, and oils are frequently applied to the surface of polishing wheels as lubricants. After a period of time, these lubricants tend to penetrate the materials from which the polishing wheels are made. Unless these oily or fatty materials are removed, subsequent coatings of adhesive will not adhere properly and shorter useful life per wheel set-up will result. Wheels so contaminated should be dressed to remove all remaining abrasive and adhesive. After this is done, the contaminant may be removed by washing in gasoline or other organic solvent. An alternate method for removing grease from polishing wheels employs lump pumice stone, water, and a clean rag. The rag is soaked in water and held against the revolving wheel. The lump pumice is held at a point just above the wet rag with sufficient pressure to cause the water and grease to be forced from the wheel surface. This latter method is more widely used, and is generally more satisfactory than using organic solvents, because it is less expensive and also does not involve the dangerous fumes which are encountered when organic solvents are employed.

When the abrasive and adhesive have been stripped from the wheel surface, it is generally good practice to apply a sizing coat of thinned-out adhesive to the wheel. brushing the nap of the wheel so that it will lie flat. A similar sizing coat is generally applied to new wheels before they are set up. The sizing coat should be allowed to dry for a sufficient period of time to permit it to set before the next coating of adhesive and abrasive is applied.

Used wheels which are not worn to the point where the wheel fabric is exposed, and which are not contaminated with oil or grease, may generally be prepared for subsequent set-up by application of a piece of lump pumice to the surface while the wheel is rotated on the lathe. The lump pumice will remove bits of metal, will open the surface of the wheel, and will provide better anchorage for the adhesive which is to be applied later. If the wheel surface is badly glazed with metallic particles, an abrasive stick is used to remove the metallic particles and is followed by application of the lump pumice. When the wheel fabric is not exposed, it is not necessary to apply a sizing coat before reheading the wheel.

In setting up a wheel with hot glue, the wheel and abrasive should be preheated to a temperature of approximately 120°F. The pre-heating will prevent rapid jelling of the glue and will allow the abrasive particles to become more securely fastened to the surface of the wheel. After the glue coating is applied, the wheel should be rolled in the abrasive trough as soon as possible, to minimize jelling which is caused by exposure of the glue to cool air. A wheel which receives a single abrasive coating should be placed in the drying room and cured for a period of approximately 24 hours. When a second abrasive coating is to be applied, the wheel should be placed in the drying room for approximately 30 minutes following application of the first coating. This will allow the glue to "set" sufficiently so that the abrasive grains of the first coating will not be dislodged from the wheel surface when the second coating of glue is applied. A wheel having two coats of abrasive will require a curing period of approximately 48 hours for best results. The curing room for wheels set-up with glue should have carefully controlled temperature and humidity. An ideal drying condition would be a temperature of 80°F. and relative humidity of 50%. A temperature of 95°F. should be accompanied by a relative humidity of 55%. These conditions will permit the glue to maintain a moisture content of approximately 12% by weight, at which point it reaches its maximum strength. Further reduction of moisture content will cause the glue to become brittle, while higher amounts of moisture cause the glue to remain in a jelly-like condition. A circulating fan, independent of the heating system in the curing room, will shorten the required curing time and will help the wheels to give more uniform results.

Cold cements, generally of silicate of soda base, require little preparation before use and, since they contain no animal matter, they are not subject to bacterial decay. In general, cold cements are manufactured in concentrated form and are thinned down before use

Off-hand grinding of weld on I-beam section using a set-up wheel.

Set-up wheel application polishing a metal rod using work-piece support.

with either water or a thinner as specified by the cement manufacturer. Because of their freedom from attack by bacteria, cold cements may be prepared in larger quantities than hot glue, and kept for long periods of time without lessening their strength.

Wheels set-up with silicate base cements may be force dried at temperatures as high as 135°F. without impairing the strength of the cement. Humidity control is relatively unimportant, but installation of an air circulating system will provide for faster drying and will assure uniformity of results.

Paste Heading of Polishing Wheels

In some cases, the abrasive grain or powder is mixed with the hot glue or cold cement and is applied to the wheel in the form of a paste. The consistency of the paste is determined by the method by which it is to be applied to the wheel. If the paste is to be brushed onto the surface of the wheel, it should be fluid enough to permit brushing into an even coating, which should be free of lumps or conglomerations of abrasive particles. If the paste is to be applied by use of a spatula type of blade, it should be of sufficient consistency that it will not flow freely. In this type of application, the paste is applied to a depth of from 1/32″ upward to as much as one inch or more. In general, paste headed wheels in grit sizes 180 and finer are prepared by brushing. In coarser grit sizes, it is general practice to apply the paste head in a manner very similar to that employed in frosting a cake.

Paste heads are widely used on wheels for double-roll machines which are used for polishing knife blades and other articles having flat, parallel surfaces. These machines use rolls or wheels which are as wide as 48″ and have diameters as large as 12″. Because of their large size, such wheels or rolls cannot be set-up satisfactorily by conventional methods.

If hot glue is employed in paste heading, the wheels should be pre-heated to a temperature of approximately 120°F. and the paste should be applied at a temperature of approximately 140°F. Care should be taken to prevent jelling of the paste by exposure to drafts or cold air. No pre-heating of the wheel is necessary when cold cements are used in making up the paste for heading.

Infra-Red Drying

Several plants have installed Infra-Red drying equipment and have eliminated their drying and curing rooms. The Infra-Red lamps are housed in a cabinet which is suitably insulated to minimize loss of heat. Infra-Red rays will dry a wheel in less time than is required for conventional drying and curing methods. Care must be taken to prevent over-heating of the wheels. Wheels headed with cold cements may be dried in Infra-Red cabinets at temperatures up to 200°F. without lessening their useful life; but it is recommended that glue-headed wheels be dried at temperatures below 160°F. A thermostat should be installed in the cabinet to assure maintenance of the proper temperature.

Breaking Up

Following the drying or curing cycle, the surface of a newly headed wheel is generally broken up before the wheel is used. The surface may be most satisfactorily broken up by pounding with a piece of pipe or round bar. The breaking up operation should be performed before the wheel is mounted on the arbor or spindle, as pounding of the wheel surface after it is mounted will result in damage to either the arbor or machine bearings — or both. The purpose of this breaking up of the wheel surface is to provide a degree of cushioning. If a hammer or sharp-cornered piece of metal is used in the breaking up of the wheel surface, part of the abrasive coating will be knocked off and there is also a possibility that the wheel itself will be cut or otherwise damaged.

Causes for Complaints

When trouble is encountered in a polishing room, the first impulse is to blame the abrasive or wheels being used, whereas the fault usually may more properly be attributed to deviation from standard good practice. Wheels which are not properly dried or which have been set up while contaminated with oil or grease, will not give satisfactory production. Likewise, glue-headed wheels which have been overdried, will lose their abrasive rapidly due to the brittleness of the dehydrated glue. If the glue has been permitted to cool before the wheel is rolled in the abrasive trough, it will not provide proper anchorage for the abrasive particles. Glue which has been overheated or heated over a period of time in excess of four hours, will retain only a portion of its strength. Wheels set up with such glue will give unsatisfactory results.

Occasionally, complaints are made that the abrasives are not properly graded, and contain coarse particles which cause deep scratches in the work pieces. This type of complaint is generally unjustified and the contamination with coarse particles is usually caused by the use of the same glue or cement brush when applying abrasives of more than one grit size. Another cause for this type of complaint is the use of the same glue pot or cement container for adhesives which are used in the setting up of wheels of various grit sizes. A separate adhesive container should be provided for each abrasive size used, and the same brush should not be used for setting up wheels of different grit sizes.

Design and Construction of A New Plating Department

By R. I. Horrocks, *Chief Chemist, Eclipse-Pioneer Div., Bendix Aviation Corp.*

RECENTLY, Eclipse-Pioneer Division, Bendix Aviation Corp., due to ever increasing demands for high quality finishes for aircraft products, undertook complete redesign of its electroplating and chemical finishing facilities. Prior to determination of final design, thorough consideration was given to current progressive trends in layout and arrangement of maintenance and service facilities. Inspection of various modern plating departments in other manufacturing plants contributed substantially to the ultimate planning of this project. Fig. 1 shows a typical working area which includes some unusual features adapted to the special needs of the firm.

The important factors in the design of the project were:

1. To have sufficient tanks to perform approximately 40 separate plating, chemical, or electrochemical processes along with sufficient cleaning, chemical dips, and rinses to satisfactorily clean and prepare a variety of metals.
2. To fit the tanks and other equipment in the area allotted.
3. To design the service equipment so that the installation would create the least disturbance to the existing building.

The shape of the area that could be allotted for the department was relatively long and narrow. Although a majority of the parts manufactured receive some metallic or chemical finish, there is a great variance in the size, shape, quantity, and scheduling of these parts so that it was impossible to lay out the plating department for a straight-line or mass production flow. It was decided to group the processes as much as possible according to those of similar nature; that is, anodizing, chemical treatments of aluminum and magnesium, electroplating, etc. Therefore, seven sections were laid out running across the area assigned, with a conveyor going the length of the area on one side to transport the work into and out of these sections. (Fig. 2.)

The various process groups are listed below according to the aisle (numbered in Fig. 2) in which they are located. Each group has its own required cleaning solutions and chemical dips for proper preparation of the metals involved:

Aisle 1: Small tanks for gold, silver, copper and brass plating.

Aisle 2: Chromic acid and sulfuric acid anodizing, black dye and dichromate seal.

Aisle 3: Caustic satin finish and chromate for aluminum; phosphating for steels; dichromate and chrome pickle for magnesium; zincate and copper strike pre-plating process for aluminum.

Aisle 4: Rochelle and high-speed copper baths, cadmium plating plus chromate post-treatment, and tin plating.

Aisle 5: Chromium plating and various pickling and stripping solutions for steel, stainless steel, and copper alloys.

Aisle 6: Bright nickel, Watts nickel, black nickel, Wood's nickel strike, passivating stainless steels, and black oxide baths for steel, stainless steel, and copper alloys.

Aisle 7: Barrel plating line for cadmium, bright nickel, copper, and tin plating.

As an example of the solutions available for cleaning and preparing the parts for plating, the following

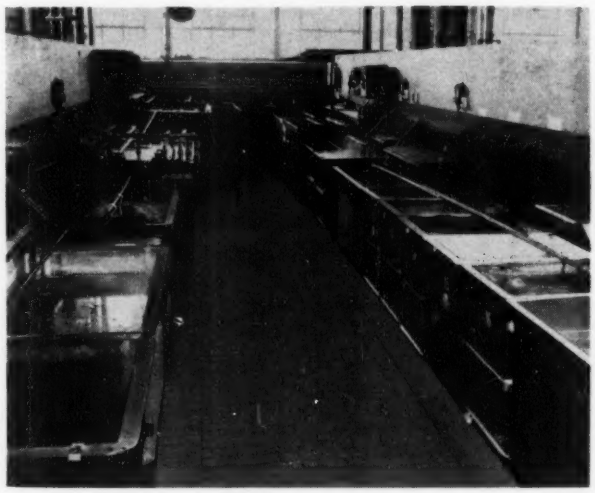


Fig. 1. General view down an aisle.

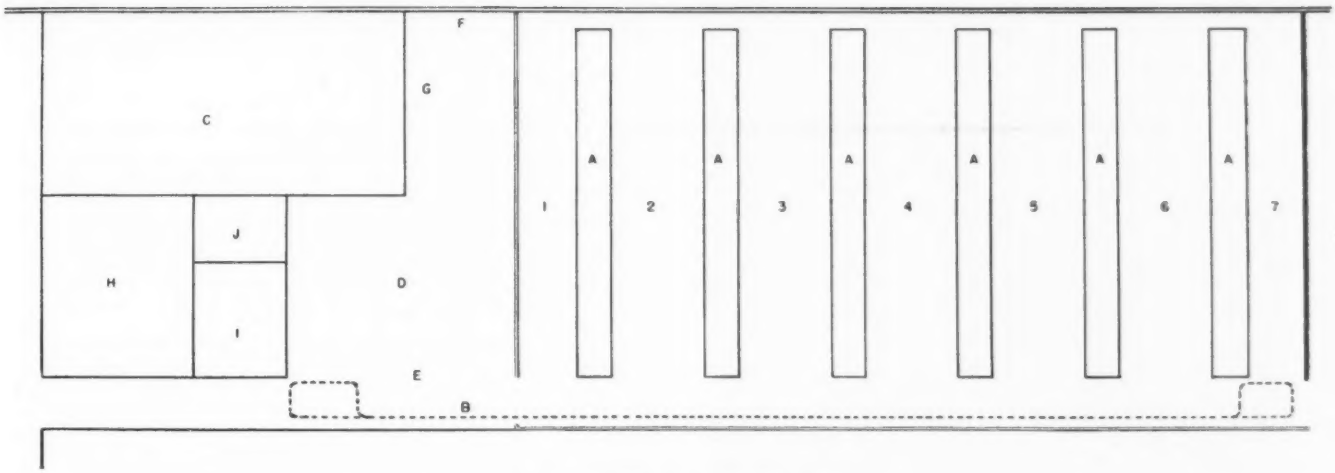


Fig. 2. General plan of Plating Dept.

A—Plenums; B—Conveyor; C—Control area; D—Wiring & racking area; E—Vapor degreasers; F—Hot oil fusing & baking; G—Rack storage area; H—Inspection; I—Office; J—Engineering work area; 1-7—Tanks & aisles.

are included in the group of tanks in Aisle 4. Each of these solutions has a rinse tank adjacent unless the solutions are similar in nature (i.e., both acid or both alkaline):

a) Electrolytic cleaner (reverse or direct).
b) Muriatic acid.
c) Brass bright dip.
d) Steel bright dip.
e) Alkaline de-rusting solution.
f) Cyanide dip.

The other groups have similar sequences but do not have tanks for those solutions not required or required only occasionally for the particular metal treated in that group.

Parts may be dried by any one or a combination of the following methods according to their complexity and whether they contain blind holes or crevices:

a) Hot water.
b) Water displacing solution.
c) Perchloroethylene vapor dryer.
d) Electrically-heated centrifugal dryer for the barrel line.

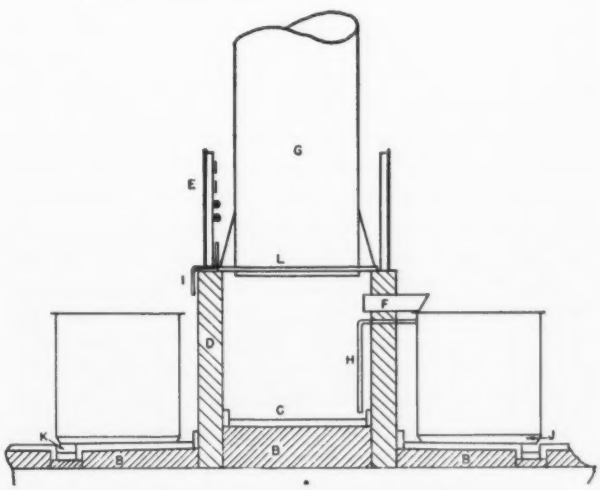


Fig. 3. Cross-section of plenum & floor.

A—Existing concrete floor; B—Added concrete for drainage slopes, etc.; C—Floor tile; D—Plenum walls; E—Support pipes & plywood baffle; F—Exhaust ducts; G—Exhaust stacks; H—Tank drains; I—Piping & wiring to tanks; J—Stringers; K—Shallow drains; L—Plenum cover.

Fig. 4. Shallow drains and stringers.

The area assigned to the plating department has no cellar. The existing floor was made of reinforced concrete covered with 2" thick treated wood blocks. To avoid digging through the cement floor, it was decided that it would be best to build the exhaust system, drains and all other service equipment above the floor level. At the same time, it was felt that the floor level of the new room should not be more than a few inches above the existing factory floor because of the traffic into and out of this area. Therefore, only the wooden blocks were removed. Very low slopes of the order of $\frac{1}{8}$ to $\frac{1}{16}$ of an inch to the foot were planned for the floor drainage. These slopes went for only short distances — from the outside walls, from the plenum walls and from the center of the aisles — to the shallow drains or trenches on either side of the aisles. (Fig. 3) In order not to cover these drains (easier to keep clean and eliminates the necessity of cover plates), they were designed to be under the front of the tanks (Fig. 4). The shallow drains also have the low slope of $\frac{1}{16}$" to the foot. These drains run into a deeper trench running the length of the room (Fig. 5). This deep trench and the plenum drain traps were the only holes that had to be cut into the existing concrete floor. By keeping the slopes to a minimum and by using the shallow drains, adequate floor drainage was achieved and yet the highest part of the floor is only

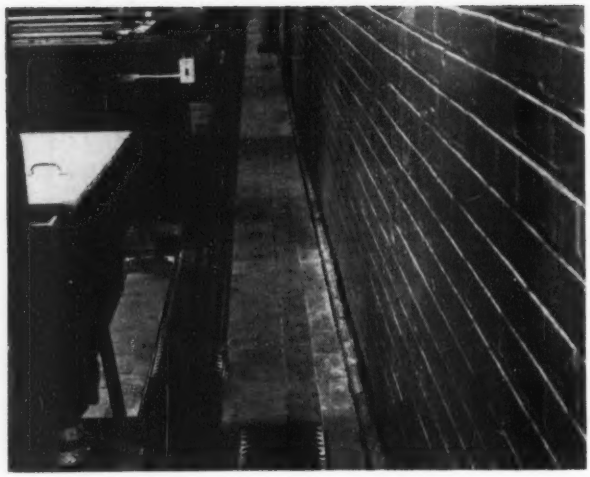


Fig. 5. Deep trench for all drainage.

about 4 inches above the wooden blocks of the present factory floor.

The largest drainage requirement is from the rinse tanks. Again it was required that this drainage be above the existing concrete floor level. Because of a dislike for the individual exhaust pipes from each tank requiring ventilation, it was decided to design a large plenum chamber between each row of tanks that would combine the exhaust and rinse drainage requirements. The cross-sectional size of the plenum was determined by the following factors:

1. The necessity to keep the airflow below 1000 feet per minute so that the tanks on the far end of the plenum would receive sufficient ventilation.
2. To provide space for the maintenance of the services installed on the top of the plenums.
3. Uniformity of plenum size for appearance reasons.

Ducts over the backs of the tanks direct the exhaust into the plenum. The drains from the rinse tanks were put through the plenum walls and down to within a few inches of the floor to reduce splashing (Fig. 3). Excessive splashing would erode the inside of the plenum walls. The plenum floor as mentioned previously was built over the existing concrete floor and, since its height was limited only by the height of the rinse tank outlets, the slope could be increased for better drainage. By means of a trap at one end of each plenum, this drainage was led into the previously mentioned deep trench adjacent. Traps were necessary because of the slight suction caused by the exhaust system inside the plenum.

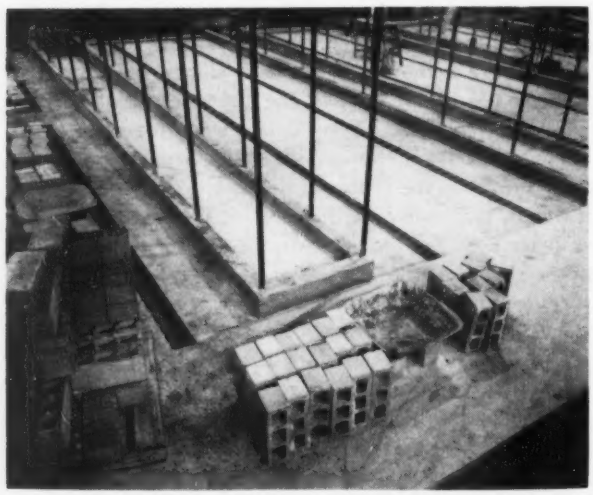


Fig. 6. Concrete laid for floor drainage, shallow drains and support pipes.

The installation of the floor followed this sequence:

1. The wooden blocks were removed and the concrete floor was cut for the deep trench and the plenum traps as mentioned previously.
2. The bottom course of cinder blocks for the plenums and the forms for the shallow drains were laid.
3. A relatively thin layer of concrete was laid to establish the slopes for the floor drainage and plenum drainage. (Fig. 6)
4. A mastic-type of impervious coating was applied to the concrete and the floor tile was laid over it.

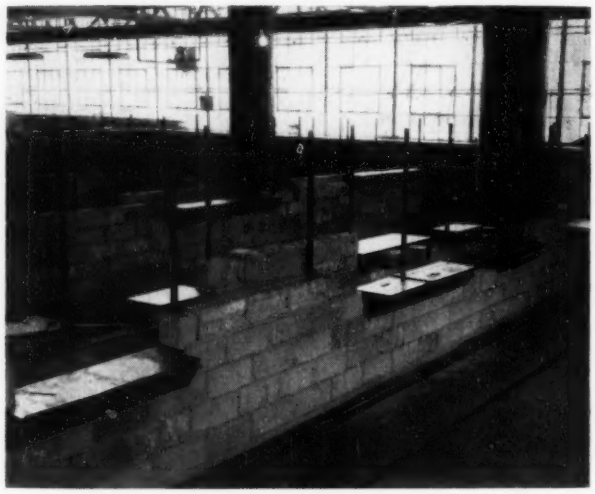


Fig. 7. Positioning of exhaust ducts and stacks.

In order to eliminate floor boards, non-skid, acid-proof tile, 4″ x 6″ x 1⅜″ thick, was chosen for the floor. Cutting of the tile at an angle to follow the slope in the shallow drains was eliminated by making the original depth and width of the drain equal to the width of the tiles. After the tile was applied to the sides of the drains, concrete was laid in the bottom of the drains and the slope established. Then tiles were laid in the bottom of the drains to form a continuous tiled floor. Tile was laid on the floor of the plenum plus one course on the sides and ends.

Iron pipes were cemented into the first course of cinder blocks (Fig. 6) and are used to hold the electrical and piping services above the plenums. The plenums were then built to the finished height of 4 feet. (Fig. 7) The cinder block walls, inside and out, were covered with a mastic material to make them water-tight, air-tight, and resistant to chemicals. (Fig. 8) Weather-resistant plywood was placed over the top of the plenum and sealed with the same mastic material.

Glass-reinforced polyester plastic was chosen for the exhaust stacks from the plenum to the outside. Three large bifurcator-type blowers (two plenums to a

blower) provide sufficient exhaust. The exhaust requirements were calculated by the method given in the standard 29.1 - 1951 "Ventilation and Operation of Open Surface Tanks" issued by the American Standards Association. In calculating the requirements, advantage was taken of the fact that adjacent tanks requiring ventilation benefited each other. The slots in the individul ducts over each tank can be adjusted to a given width to provide the recommended slot velocity at the front of the tank to properly remove the fumes.

On the anodizing and chromium plating tanks, where both excessive gassing and toxic fumes are encountered, a push system was also installed. This consists of a 1½" pipe located on the front of the tank and having a number of small holes evenly spaced facing towards the exhaust ducts at the back of the tank. Using a low-pressure air supply, the fumes are blown or pushed towards the exhaust ducts as well as being sucked into them.

All services come from overhead and down either

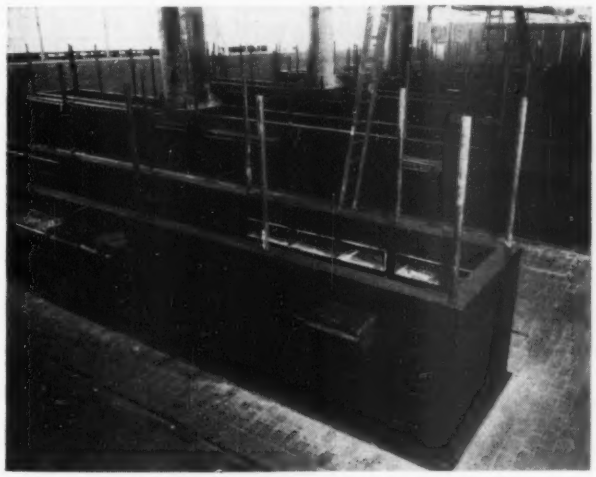


Fig. 8. Completed plenum walls with mastic coating.

side of the exhaust stacks. The steam, water and 110 volt electricity come from the main factory lines near the ceiling. The electrical sources for plating and the compressed air for agitation and air screening come from small sheds on the roof. From the exhaust stacks the services are piped or otherwise installed to the applicable tanks. These pipes and wiring are supported on the previously mentioned pipes which extend about 2½ feet above the top of the plenum walls. (Fig. 9) These services are covered from view by plywood boards which also act as baffles to improve the ventilation over the tanks. There is sufficient room between the sides of the plenum to make any change in services and do other maintenance work.

The tanks are placed in front of the plenum walls with the fronts in line wherever possible. The aisles are 5 feet wide in most cases. The tanks were mounted on 2 inch thick cypress stringers (Fig. 4) that were cut at a slight angle to compensate for the slope of the floor and thereby keep the tanks level. The new metal tanks were purchased with an epoxy resin, acid and alkali resistant paint. The old tanks that were used in the new plating room were cleaned, sandblasted and covered with the same paint.

Fig. 9. Pipes and wiring over plenum.

Whenever possible, the glass-reinforced polyester plastic material was specified for the new tanks to be purchased. These applications included most cold water rinses, hot water rinses, muriatic acid, cyanide, and dilute acid dips.

The large rectifiers, the motor-generator sets and the air compressor are located in three conveniently-spaced sheds on the roof. (Fig. 10) In this way, they are out of the corrosive atmosphere of the plating room. Remote control units for the above are mounted in convenient locations on the plywood boards over the plenums. Also mounted on the boards are the tank rheostats, small rectifiers, and the temperature regulators.

In order to confine the corrosive vapors and to keep the oil and dust-laden air of the factory from the plating room, it is planned to construct a floor-to-ceiling wall around the plating room. A false ceiling made of corrugated sheets with numerous small holes will be installed over the room. Make-up air will be supplied from vents in the roof and be fairly evenly distributed to the plating room through the false ceiling. This air will be heated in the winter with space heaters.

The barrel plating line was planned to handle small parts that are difficult and/or uneconomical to wire or rack. (Fig. 11) Two types of baskets are used: (1) A 9½" dia. x 9½" long octagonal basket for the

Fig. 10. Rectifiers and motor-generator sets in one shed on roof.

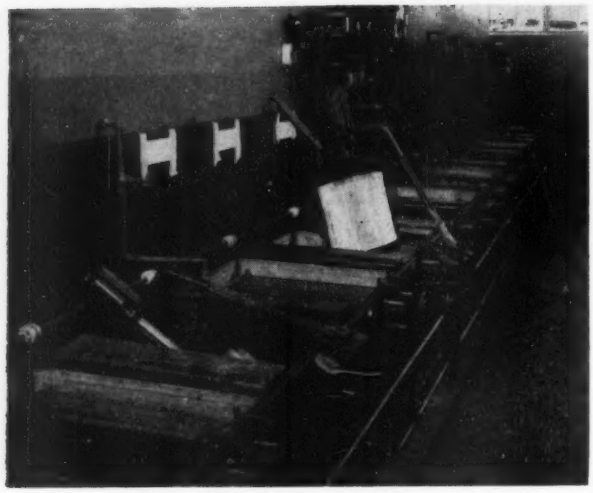


Fig. 11. Barrel line showing trolley to convey barrels.

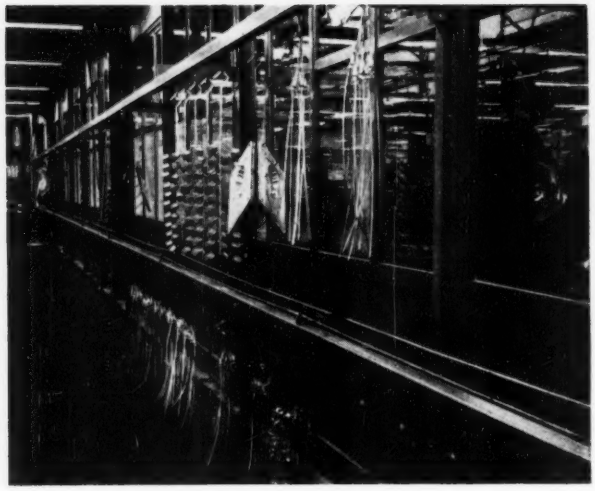


Fig. 12. Conveyor.

larger loads that are encountered; (2) a multiple-type with four small baskets, each 7″ x 4″ in diameter, attached to a common base for the very small lots of parts.

The tanks for this barrel line are mounted on two long angle-iron frames placed end to end. The exhaust slots are the down-draft type on the sides of the tanks and are connected into the plenum. A motor mounted at one end drives the shaft which, in turn, drives the barrels through a worm gear at each tank. The barrels are held by a trolley which runs on two round tracks mounted on the angle-iron frame in front of the tanks. By means of the trolley, the barrels can be carried to any tank and slid into position on the front of that tank. The trolley can then be moved to another tank to transport another barrel by sliding onto the trolley. The trolley loaded with a barrel can pass any other barrel that is positioned on a tank. By this method, it is not necessary to have an overhead hoist to lift the heavy barrels.

The work-flow pattern for this plating area is as follows: (Refer to Fig. 2)

1. Parts to the plated or treated are moved into the Control Area (C) where the proper operation sheets and blueprints are attached to each lot or type of part.
2. When work is required, the plating lead man brings it into the wiring and racking area (D).
3. After wiring or racking, the parts are vapor degreased (E) and placed on the conveyor (B).
4. The platers then take their particular type of work from the conveyor, perform the necessary operations and return the completed work to the conveyor.
5. The parts that require the fusing of the tin plate or heat treatment for hydrogen embrittlement relief are taken to the adjacent area (F) for this treatment. The parts are then removed from the wires and racks and returned to their respective containers or tote boxes.
6. The finished parts go through the control area to Inspection (H) and then are released to stock.

The conveyor is of the endless-chain type with the section going in one direction over the returning section in order to save space. (Fig. 12) The lower level is 3½ ft. above the floor and the upper level is 6½ ft. Therefore, the parts can be removed from either level; this eliminates waiting for them to go completely around the conveyor before picking them up.

Surface Treatment and Finishing of Light Metals

Part XII-C. Plating on Aluminum — Zinc Immersion Processes

By S. Wernick, Ph.D., M.Sc., F.R.I.C., F.I.M. and R. Pinner, B.Sc.

PROBABLY most electroplating on aluminum is today carried out on top of zinc coatings which are applied by a chemical immersion process. Basically these processes differ little in their mechanism from the use of electrodeposited zinc as employed in the Vogt process to be described in a forthcoming issue, though in practice there are two distinct differences. These are (a) that the application of zinc by chemical immersion is cheaper but that (b) the electrolytic process is markedly less sensitive to alloy composition, as would indeed be expected, and can be used for plating components assembled from more than one alloy or from an aluminum alloy with another metal, such as brass. If, therefore, the reason for the extensive use of the zinc immersion process, both in America and in European countries, is due to its relative simplicity and cheapness, it is by no means universally applicable.

The zinc immersion process was first developed by Hewitson[1] in 1927 but was shortly to be found in use in Germany, [2,3] in Britain[4] and in Russia.[5] In America its development was soon followed first by the patents of Korpium[6] and Perner,[7] after which a number of research workers reported on the process.[8-14]

Theory of the Zinc Immersion Process

That the dissolution of zinc in alkaline solution is electrochemical in character was shown recently by Straumaris and Brakss,[17] Streicher[18] and Petrocelli.[19] The basic net reactions in the alkaline zincate solution are the dissolution of the aluminum and the deposition of zinc. To a greater or lesser extent, some hydrogen evolution may also take place at the cathodic areas, though at the high overpotential of zinc this is usually unimportant.

The basic reaction may be written as:

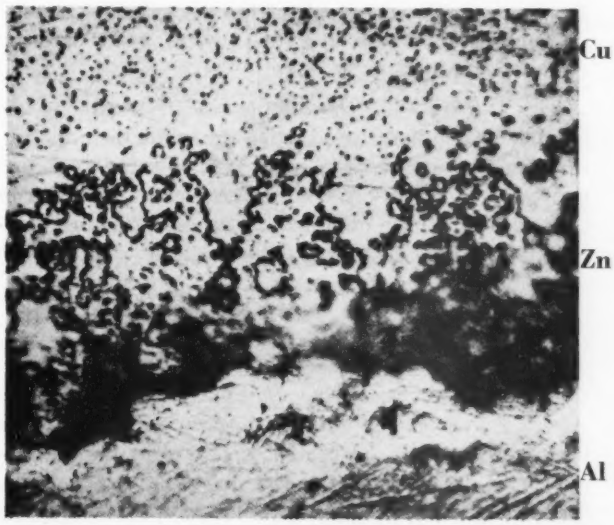
$$\textit{Anodic:}\ Al + 3OH^- \rightarrow Al(OH)_3 + 3e^-$$
$$Al(OH)_3 \rightarrow AlO_2^- + H_2O + H^+$$
$$\textit{Cathodic:}\ H^+ e^- \rightarrow H \rightarrow \tfrac{1}{2}H_2 \uparrow$$

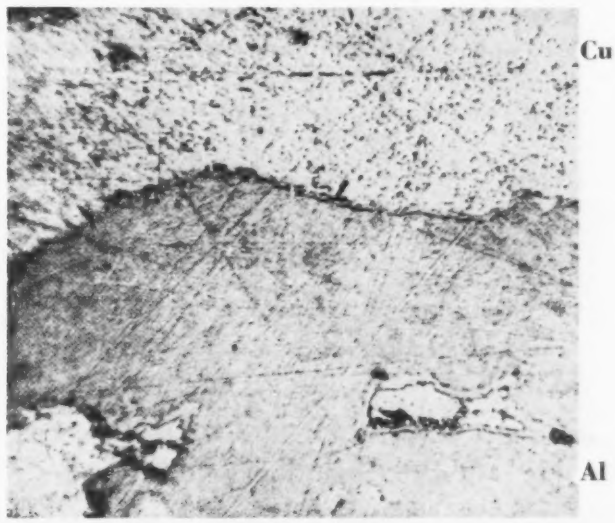
Recent work by Dirkse[20] has shown that the zincate ion in strong alkaline solution is probably in the form $Zn(OH)_4^=$. The deposition of zinc, therefore, may be expressed as:

$$\textit{Cathodic:}\ Zn(OH)_4^= \rightarrow Zn^{++} + 4OH^-$$
$$Zn^{++} + 2e^- \rightarrow Zn$$

The quantitative relationship between aluminum dissolved and zinc deposited was measured by Bengston[8] who found that on commercial aluminum the changes were:

	mg. per sq. cm.
Aluminum dissolved	0.017
Zinc deposited (found)	0.057
Zinc deposited (theoretical)	0.062





Figs. 1 and 2. Taper sections of commercial-purity aluminum dipped in sodium zincate solutions for 3 minutes and copper plated. The sections were at 5 deg. to the plane of the surface to give a view of the deposit at changing thickness. Fig. 1 shows the deposit from the dilute zincate solution and Fig. 2 the deposit from the concentrated zincate solution.[15]

Mechanism of Zinc Deposition

The mechanism of deposition of zinc from the zincate solution is not only of theoretical interest because on the form the deposit takes depends the adhesion of a subsequent plated coating. As the lattice constant of aluminum is 4.04Å compared with 2.66Å for zinc, Bullough and Gardam point out that, by replacement of two Al atoms by three Zn atoms, the zinc deposit can be formed on the 110 plane as a molecular layer with little distortion, though not in the hexagonal basic zinc lattice. On the 100 and 111 planes, on the other hand, hexagonal lattices may be formed, in the first case, particularly, with some distortion. As shown in Figs. 1 and 2, however, whether in fact an adherent film is obtained depends on the concentration of the solution and other factors.

From these cross-sections and from electron diffraction patterns, Bailey[15] concluded that from a dilute zincate bath, containing zinc oxide 5 g./l. and sodium hydroxide 45 g./l., thicker, large-grained zinc deposits (1,000 crystals per cm.) were obtained with a tree-like structure 10^{-3} cm. diam. $\times$ 10^{-5} cm. high which may correspond to single crystals. This is in contrast to deposits from a more concentrated solution, containing zinc oxide 50 g./l. and sodium hydroxide 262.5 g./l., which are finer grained and more compact. In this case, too, the deposit was covered by a thin film of zinc hydroxide (approximately 100Å thick) which, as Bailey showed by tests with 14 different solution compositions, is always present under conditions associated with good adhesion. From theoretical grounds Bailey calculated the crystal size found in the concentrated solution as approximately 1/100 that in the dilute solution, with a correspondingly large increase in adhesion between the zinc and aluminum in the former.

Effect of Solution Composition

As is seen from the results described, there is a lower limit to the concentration of the zincate solution below which adhesion is generally poor. Bailey's attempt to correlate adhesion with solution composition is shown in Figs. 3-5. This author measured adhesion by plating zincate-treated 8 w.g. sheet samples 2 in. $\times$ 4 in. with

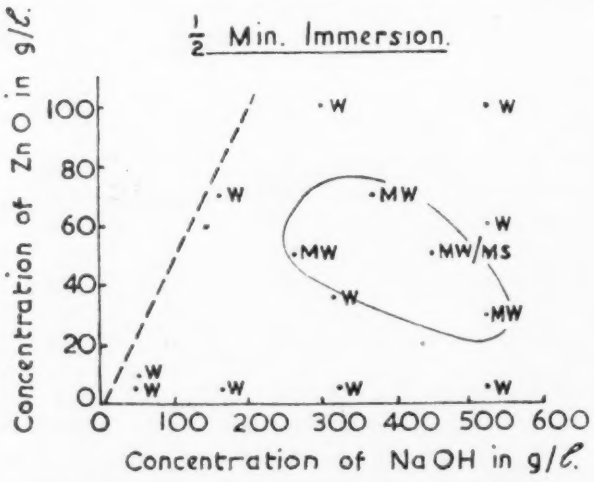


Fig .3. The effect of solution concentration on adhesion of zinc deposit obtained after ½-minute immersion in zincate solution. Adhesion ratings: W = weak, M.W. = medium weak, M.S. = medium strong, S = strong.

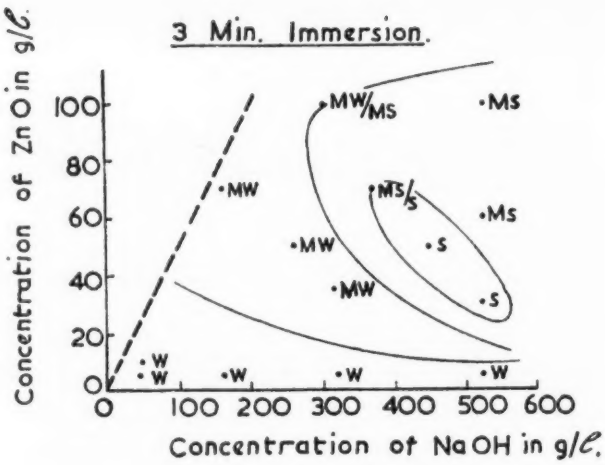


Fig. 4. As Fig. 3 after a 3-minute immersion.

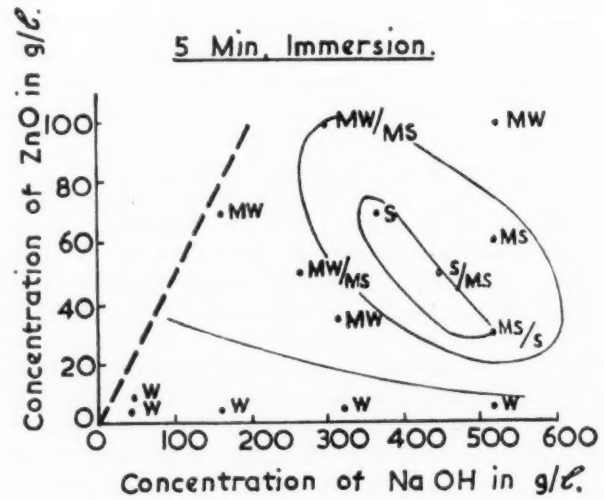


Fig. 5. As Fig. 3 but after a 5-minute immersion.

2 mil nickel, after which the samples were heated until the aluminum fractured. Peeling of the nickel was taken as "weak" adhesion. If the deposit could be separated by hammering with a chisel, "medium-weak" or "medium-strong" ratings were given according to the force required to pull off the coating. A "strong" adhesion rating was accorded where no separation could be effected.

Figs. 3-5 show that ½ minute zincate treatment was insufficient to obtain good adhesion, while the adhesion after 3 and 5 minutes was approximately similar. These curves coincide closely with differences in the electron diffraction patterns obtained. A suitable solution composition thus includes approximately:

Zinc oxide	40-50 g./l.
Sodium hydroxide	400-450 "

The effect of alkali concentration of the zincate solution on the weight of the deposit formed is seen in Fig. 6, which shows that the higher the caustic soda concentration, the lower the weight of zinc initially deposited. After the first 15 seconds (approximately), the gain in weight of the deposit is approximately independent of alkali content.

More recently, a modified zinc immersion solution

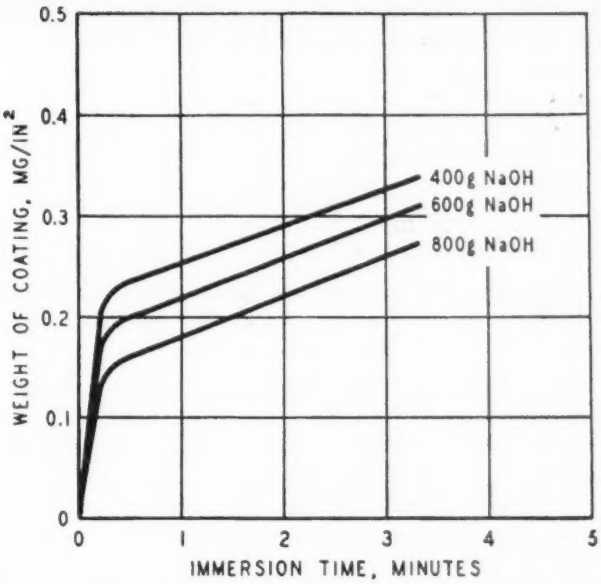


Fig. 6. Effect of concentration of the zincate solution on the weight of the deposit formed on commercial aluminum (2S) sheet at 70°F. The weights refer to g. per l.[14]

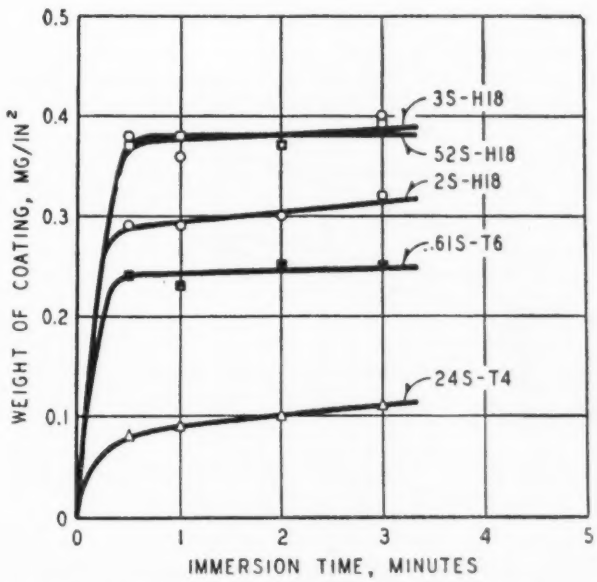


Fig. 7. Weight of zinc immersion coating obtained on different wrought alloys using the same pre-treatment.[14]

has been mentioned by Zelley[16] which is stated to give improved results. This solution contains:

Sodium hydroxide	500 g./l.
Zinc oxide	100 "
Ferric chloride	1 "
Rochelle salt	10 "

This solution has been found to give more uniform coverage than the conventional bath. In addition, this solution improves the efficiency of the double-immersion treatment on magnesium-containing alloys and on many die-castings. It is also stated to improve the corrosion resistance except on the duralumin-type alloy 24S and the Al-Zn-Cu-Mg alloy 75S. With alloys of high magnesium content, the Rochelle salt content may be raised to 100 g. per l.

A further modification described by the same author applies to the dilute zincate solution. As seen from the results given by Bailey above, these solutions give coarse, thick deposits of generally low adhesion. According to Zelley this may be overcome by addition of sodium nitrate in a solution containing:

Sodium hydroxide	120 g./l.
Zinc oxide	20 "
Ferric chloride (cryst.)	2 "
Rochelle salt	50 "
Sodium nitrate	1 "

Surface preparation, as well as time and temperature of zinc immersion are particularly critical in the dilute bath, and the treatment should be carried out below 75°F. for not longer than 30 seconds.

Various other modifications of the zincate solution have been suggested. Thus Bengston[8] proposed the use of zinc sulphate instead of the equivalent amount of zinc oxide for zincate solutions used on alloys containing copper (e.g., 24S-T), while the addition of 5 ml. per l. hydrofluoric acid (48 per cent HF) gave good results on the silicon-containing alloy 61S-T. In one proprietary process,[21] a small amount of copper is added to the solution.

Effect of Alloy Composition

"The way in which zinc deposition varies with alloy composition is shown in Fig. 7. Results which differed in some instances were obtained by Bengston[8] who found rather lighter deposits on 3S and heavier deposits on 61S-T and 53S-T alloys which showed a rise in the rate of growth after 1 minute. As has been seen, the thinner, more compact deposits generally show the better adhesion properties. In practice, however, the technique used may have to be adapted to suit varying alloy compositions or structure.

The effect of alloy composition is in some cases due to the difference in potential of the alloy from the zinc in the alkaline solution, e.g., aluminum and the aluminum-magnesium aloys have a higher potential difference with respect to zinc than the heavy metal-containing alloys, resulting in a thicker zinc deposit for the

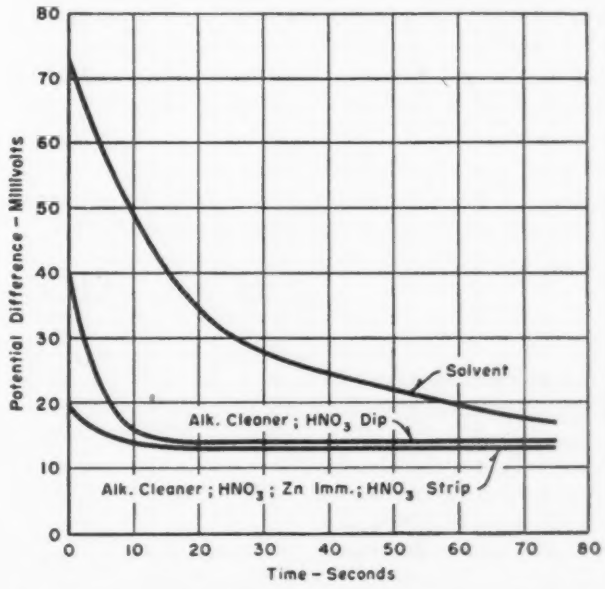


Fig. 8. The potential difference between commercial-quality aluminum 2S-H28 after various pre-treatments and high-purity zinc in a solution containing 500 g./l. sodium hydroxide and 100 g./l. zinc oxide.[16]

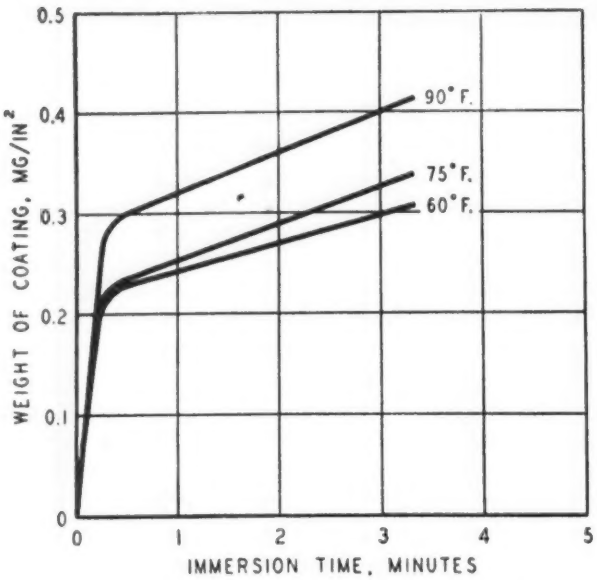


Fig. 9. The effect of temperature of the zincate solution on the weight of the deposit on commercial aluminum (2S) sheet after various immersion periods.[14]

same conditions. Local potential difference between alloy constituents may also play a part.

An investigation of the adhesion of the zincate deposit on various alloys was carried out by Bailey.[15] This author used specimens which were degreased and etched for 2 to 5 minutes in a nitric-hydrofluoric-acid mixture recommended by Bullough and Gardam[11] containing hydrofluoric acid (40 per cent) 10 vol., nitric acid (d. 1.42) 10 vol., water 80 vol., with a subsequent dip in 50 per cent (vol.) nitric acid for a few seconds (for Al-Si alloys, 4 minutes in 98 per cent (vol.) nitric acid, 2 per cent hydrofluoric acid). Subsequently, Bailey immersed the samples in a zincate solution containing 525 g. per l. sodium hydroxide and 100 g. per l. zinc oxide, and tested for adhesion after copper and nickel-plating.

On heat-treated duralumin-type alloys (3.7 per cent Cu) "good" adhesion was obtained by extending the nitric acid dip to 30 seconds. On aluminum-magnesium alloys (3½ per cent and 7½ per cent Mg) adhesion was in all cases "medium" to "poor," with no improvement in using a chromic-sulphuric acid etch. "Good" adhesion was obtained on aluminum—1¼ per cent manganese alloys using the standard procedure, while on an aluminum—12 per cent silicon alloy it was not possible to obtain good adhesion with any combination of etch and immersion treatment used.

No difference was found in the behavior of fully annealed aluminum or aluminum—1¼ per cent manganese alloy as distinct from the hard-rolled material.

Markedly poor adhesion was obtained on all alloys with the dilute zincate dip used by Bullough and Gardam.[11]

As in the case of variations in alloy composition, the pretreatment may affect zinc deposition via the potential of the aluminum. Fig. 8 shows the potential difference between commercially pure aluminum treated in various ways and zinc in a zincate solution, while the effect of these treatments on the zinc deposit is shown in Table I.

As is shown by the zinc content and electrical resistance values, the very thin zinc deposits, e.g., obtained by the double zinc immersion treatment, are not pure zinc, though no analyses have been published.

TABLE I.

Effect of Pretreatment on the Zinc Immersion Deposit on Commercial Aluminum (2S-H28)

Treatment	*Coating weight, mg. per sq. dm.*	*Zinc content (per cent)*	*Resistance,* micro ohms*
Electrodeposited zinc	—	—	5
Solvent cleaned; 30 second immersion	15.8	93.8	10
Alkali cleaner, HNO_3 dip, 30 second Zn immersion	5.3	83.0	15
Alkali cleaner, HNO_3 dip, double 30 sec. Zn immersion	2.5	72.5	70

*The surface resistance was measured by a Kelvin Bridge using 0.25 sq. in. contacts and 500 lb. pressure.

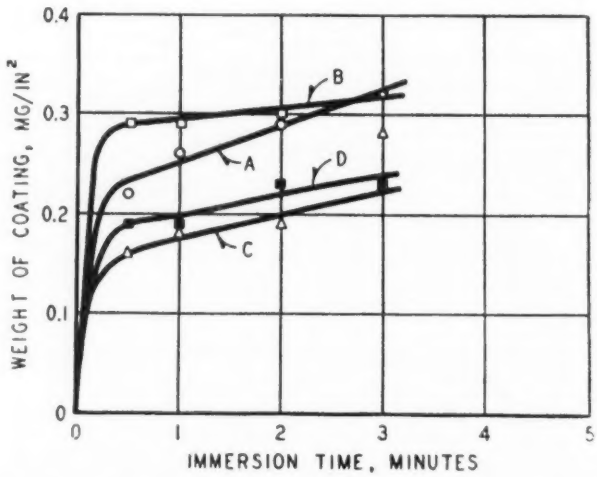


Fig. 10. The effect of different pre-treatments on the weight of the zinc immersion coating on commercial aluminum (2S). A: carbonate-phosphate cleaner-zinc dip; B: as A but cleaning followed by 25% sulphuric acid etch; C: as A but double zinc dip; D: phosphate-nitric acid chemical polishing solution plus zinc dip.[14]

Effect of Temperature

The effect of operating temperature on the deposit thickness obtained from the zincate solution is shown in Fig. 9. As is seen the initial rate of deposition is increased appreciably by the use of high temperatures.

Experiments by Bailey[15] showed that in the solution containing 520 g./l. sodium hydroxide, 100 g./l. zinc oxide, good adhesion was obtained with 1 to 3 minutes immersion, while at 85°C. adhesion was good after 1 minute but poor after 3 minutes. At low temperatures, i.e., below 20°C., longer immersion times were required to secure good adhesion, and at —6°C. the reaction had slowed down so much that a 20-minute immersion was needed to give good adhesion (i.e., over 5 tons per sq. in.).

TABLE II

Thickness of Zinc Deposit obtained on Aluminum Alloys given various pretreatments before Zinc Immersion[16]

Alloy	Pre-treatment	Zinc immersion treatment: Time (min.)	Zinc immersion treatment: Temperature (°F.)	Zinc deposited: mg. per sq. in.	Zinc deposited: micro inches
2S-H16	A, B, C	1	74	0.10	0.8
3S-H16	A, C	½	76	0.23	1.9
24S-T4	A, C	3	76	0.39	3.3
	A, B, C	1	78	0.14	1.2
	A, C	1	76	0.34	2.9
	A, C	3	75	0.48	4.1
	A, D, C	1	75	0.09	0.7
	A, D, C	3	90	0.12	1.1

A—1 min. carbonate-phosphate cleaning etch.
B—1 min. zinc immersion dip.
C—½ min. immersion in 1 : 1 nitric acid or, when after zinc immersion, until zinc is removed.
D—5 min. in 25 per cent sulphuric acid at 175°F.

Effect of Pretreatment

The type of cleaning and etching procedure adopted before the immersion in the zincate bath may have a significant influence on the deposit obtained. This is demonstrated in Fig. 10 in which the deposit growth on commercial aluminum is plotted after treatment in A. a carbonate-phosphate cleaner; B. the same cleaner followed by a 25 per cent sulphuric etch; C. the same cleaner followed by a double zinc treatment; D. a phosphoric-nitric-acid base chemical polishing solution.

The double zincate process, which involves stripping the zinc coating in nitric acid and re-immersing, is useful on wrought alloys, except those with high magnesium contents, and some cast alloys. As is seen, the chemical polishing process also gives the light compact deposit which is found most suitable.

Double Zinc Immersion Technique

The double zinc immersion technique, by which the first zinc coating is stripped in nitric acid and a new zinc deposit applied was suggested by Korpium[6] and later used also by Ehrhardt and Guthrie.[10] This method has been found useful in plating many alloys which are difficult to plate satisfactorily by the single zinc immersion method. The reason for the success of this method has not finally been clarified. The second coating has been shown, however, to be more compact and to consist of a larger number of fine grains and it is possible that applying and removing the first zinc deposit results in more uniform surface conditions for the second treatment.

Table II gives details of deposit weights in relation to variations in technique on a number of alloys treated by various methods including double immersion treatment. As is seen, the second zinc immersion treatment gives thinner deposits, despite longer treatment, both on commercial aluminum (2S) and on aluminum-1¼ per cent manganese alloy (3S).

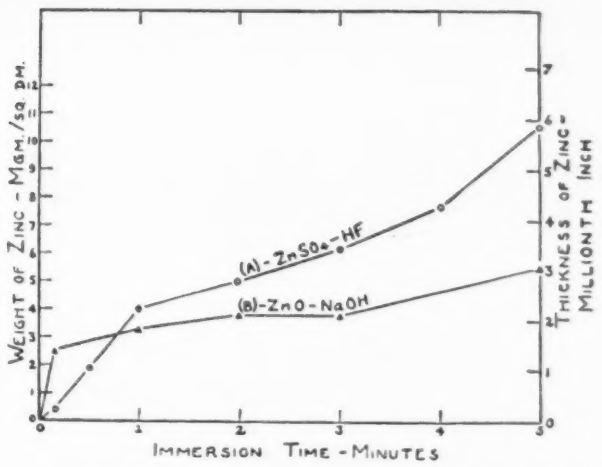


Fig. 11. Thickness of zinc deposited by immersion on commercial aluminum (2S) as a function of time of immersion. A: zinc sulphate = 5N, hydrofluoric acid = 0.5 N. B: zinc oxide 100 g./l., sodium hydroxide 500 g./l.

Recently the double immersion technique has been used in conjunction with electrodeposition of zinc in a modification of the Vogt process.

Acid Fluoride Immersion Treatment

Of some interest is a range of solutions used for immersion deposition developed by Heiman.[12] This author proposed a zinc solution containing:

Zinc sulphate	719 g./l.
Hydrofluoric acid	35 "

though the composition is by no means critical. This solution is used at 25°C. with mild agitation for immersion times varying from 5 to 60 seconds. Good adhesion was obtained on commercial aluminum as well as on duralumin and a number of other alloys, adhesion values above the U.T.S. of the basis metal being obtained by the Ollard test on aluminum plated by this method.

Fig. 11 shows the comparative growth of the zinc deposit in this solution compared with the standard zincate solution.

The same author obtained similar results with an immersion solution based on cadmium:

Cadmium sulphate	3.6 g./l.
Hydrofluoric acid (48%)	105 ml./l.
Hydrolyzed glue	2.0 g./l.

This solution is stated to be suitable as a base for heavy copper deposits on aluminum. There would seem, however, to be no advantage over the zinc solutions. A similar solution used for tin immersion deposits is described in a forthcoming section.

Finishing Pointers

Analytical Factors

By J. B. Mohler

THE strength of a standard solution and the size of the sample taken determine the volume of a titration for a given concentration of a plating bath. The volume of the titration should be sufficiently large for easy accuracy, but small enough for rapid titration. A titration range of 10 to 15 ml. is ideal for analyses of electroplating baths.

At times it is helpful to estimate the expected volume for a titration before making a standard solution. The strength of the standard or the sample size can then be selected or adjusted to obtain a titration in the desired range.

General practice in an analytical laboratory is to make up solutions of approximately 1/20, 1/10, 1/2 or 1N and then standardize these solutions in terms of normality. From a titration and the known normality, the result is calculated. For routine analyses it is more common to calculate a factor or to standardize in terms of a factor in order to simplify the calculation. For direct control analyses at the plating line it is often convenient to adjust a standard solution to a factor of one so that the calculation is eliminated.

The following formulas are convenient to estimate the strength of solutions, to calculate adjustments and to calculate factors:

1. $FV = \text{oz./gal.}$
2. $\dfrac{NVE}{7.5S} = \text{oz./gal.}$
3. $N = \dfrac{7.5\,FS}{E}$
4. $NE = \text{g./l.}$
5. $N_1V_1 = N_2V_2$

where: F = factor
V = volume of titration
E = equivalent weight
N = normality
S = ml. of sample
V_1, V_2 = volume of solution

Formula 1 is the most popular. A standard solution is titrated with the same sample size to be used in the analysis.

The factor is then:

$$F = \frac{\text{oz./gal.}}{V}$$

If the normality of a solution is known, F can be calculated from the formula:

$$F = \frac{NE}{7.5S}$$

Example: What is the factor for titration of Na_2CO_3 with N/1 HCl to a Methyl Orange end-point for a 10 ml. sample.

$$F = \frac{1 \times 53}{7.5 \times 10} = 0.707$$

To make up a solution and adjust to a factor of one, the following procedure and calculations are useful:

Example: To determine H_2SO_4 with standard NaOH, a 10 ml sample, titration to a Methyl Orange end-point, and a factor of one.

$$N = \frac{7.5\,FA}{E}$$

$$= \frac{7.5 \times 1 \times 10}{49} = 1.53\text{N NaOH}$$

$$\text{g./l.} = NE = 1.53 \times 40$$

$$= 61.2 \text{ g. NaOH dissolved and diluted to 1000 ml.}$$

To allow for the fact that the NaOH will not be 100% pure, weight about 5% excess or about 64 grams. Determine the normality by titration with a standard and adjust to 1.53N by dilution.

For example, if the normality is found to be 1.56 then:

$$V_1 = \frac{N_2V_2}{N_1} = \frac{1000 \times 1.56}{1.53} = 1020$$

$$1020 - 1000 = 20$$

Therefore add 20 ml of water to 1000 ml of 1.56 N to obtain 1.53 N.

Conversion of Factors

The following formula can be used to convert from one factor to another:

$$F_1 = F_2 \times \frac{S_2}{S_1} \times \frac{N_1}{N_2} \times \frac{E_1}{E_2}$$

For titration of boric acid with NaOH the following

(*Concluded on page 67*)

Determining Iron in Chromium Plating Solutions

By Dr. Heinz W. Dettner, *Bielefeld, Germany*

AS it is well known, iron may be present in chromium plating solutions as an unwelcome impurity. It contaminates the plating solution as a result of anodic dissolution of steel tanks and chemical dissolution of parts fallen into the tank, in chromium plating of hollow parts, or by addition of iron-containing water (from rinse tanks or chrome mist collectors). Although different proposals for elimination of iron from chromium plating solutions have been offered, none of them has been very really successful until the present. These proposals were ion exchange treatment and cataphoretic separation with a diaphragm installation.[1]

The troubles encountered when iron contamination is present in chromium plating solutions are the reduction of the current efficiency and conductivity paralleling the rise of resistance of the solution and an equivalent consumption of current. The metal deposits are coarse grained and generally dull. Sometimes spotty coatings are deposited, owing to the restriction of the bright plating range. Moreover, these deposits are brittle. Besides, it is well known that chromium plating solutions containing a high iron content, are more sensitive to variations of the catalyst ratio.

It is, therefore, necessary from time to time, at least when troubles occur, to carry out an analytical determination of the iron. This may be determined by polarographic analysis according to E. Müller and Haase.[2] As the required apparatus for this method rarely is present, the gravimetric method, hitherto, has been employed (oxidation in alkaline solution, filtration and weighing the precipitate). Some prefer the volumetric method and, according to Zimmermann-Reinhard, reducing the precipitated iron hydroxide with stannous chloride and titrating with potassium permanganate.

Using a new complexometric method, the iron content may be determined in a convenient and quick way by means of chelating agents. E.D.T.A. (ethylene diaminetetra acetate - disodium dihydrate salt) is used and 10% disodium-brenzcathechine — 3,5-disulfonate as an indicator.[3] The annoying oxidation of the divalent iron, to the trivalent state is then unnecessary.

The method is as follows:

1. Dilute 5 ml. of the chromium plating solution to 150-200 ml. with distilled water.
2. Adjust pH to exactly 2.5 with ammonium hydroxide (or if necessary, c.p. sulfuric acid). It is very important to closely maintain the pH at 2.5 as, otherwise, the indicator is ineffective.
3. Add 3 ml. of an aqueous 10% disodium-brenzcathechine — 3,5-disulfonate solution as an indicator, which produces a blue-green color.
4. Titrate with 0.05 M E.D.T.A. until the color is just discharged.
5. Calculate results:
   ml. E.D.T.A. used $\times$ 0.558 = grams per liter of iron in the plating solution.
   ml. E.D.T.A. used $\times$ 0.0744 = ounces per gallon of iron in the plating solution.

If the iron content of the chromium plating solution exceeds 20 grams per liter (2.6 ounces per gallon), it is preferable to carry out the determination with a more diluted sample. In this case the sample of the original plating solution is diluted in a volumetric flask from 10 to 100 ml. and a 10 ml. aliquot taken for determination as outlined before.

The factor is in this case 2.79 for grams per liter and 0.37 for ounces per gallon.

References

1. German patent 814,080 (Aug. 28, 1949).
2. Zeit. fur Anal. Chemie, **91**, 241 (1933).
3. Riedel de Haën, Seelze bei Hannover, Germany. Cat. No. 30193. Merck A. G., Darmstadt, Germany. Cat. No. 1922.

FINISHING POINTERS

(*Concluded from page* 66)

numerical values describe the titration:

1. S = 5, N = 0.1, E = 61.2, F = 0.163

For sulfuric acid, the following describe another titration with NaOH:

2. S = 25, N = 1, E = 49, F = 0.261

If all conditions are known, except F for the boric acid, it can be calculated as follows:

$$F_1 = 0.261 \times \frac{25}{5} \times \frac{0.1}{1} \times \frac{61.2}{49} = 0.163$$

The formula is most convenient to use in part as for the calculation of a factor for a change in sample size. This is convenient where it is desirable to change the volume of the titration.

Example: Assume the above case for sulfuric acid, but a 10 ml. sample. What would the factor be?

$$F = F_2 \frac{S_2}{S} = 0.261 \times \frac{25}{10} = 0.652$$

A little time spent in converting to a better sample size or in adjusting a solution to a convenient factor may save a few minutes each day. Such savings of time are well worth while for frequent routine analyses.

Science for Electroplaters

21. Throwing Power

By L. Serota

THE term throwing power, as distinguished from covering power, denotes the extent to which, under certain conditions in a plating bath, a uniform distribution or thickness of metal is obtained on different parts of the cathode. It is not a specific or inherent property of a solution. Metal distribution is the resultant of factors pertaining to the physical, chemical and electrical characteristics of an electrolytic (plating) process. Tank and electrode geometry (arrangement), the type of cathode (flat, projecting or recessed), agitation and, to a lesser extent, temperature are some physical factors affecting metal distribution. Chemical factors affecting throwing power are variations of tank composition, pH, impurities, and addition agents. Current density, cathode efficiency, and conductivity are electrical factors associated with metal distribution.

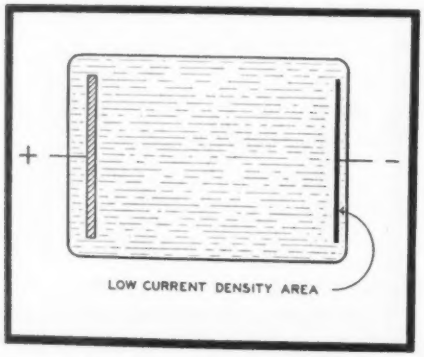


Fig. 99. Covering Power Cell.

Covering Power

Covering power of a plating solution refers to the ability of the solution to cover a cathode completely with deposited metal. It is the minimum current density at which the deposit will start to form and any point on the specimen with a lower current density will not be plated. This characteristic is not a function of the solution but depends upon such factors as polarization and surface (rough, dull, or polished). In some cases, as in chromium plating, R. Pinner reports improved covering power on recessed parts of nickel plated copper when thicker coatings of nickel are applied. This he attributes to the porosity of thinner deposits. A rough surface will not give the same covering power as that obtained on a comparable smooth (polished) one, due partly to the greater cathode area for the rough surface and the recessed areas.

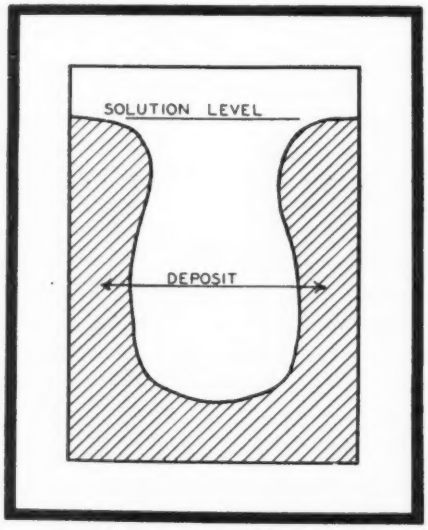


Fig. 100. Low Current Area Deposit.

For example, in the zinc plating process, the basis metal (malleable iron) is flashed with tin because the higher hydrogen overvoltage of tin compared to iron will enable the zinc to cover the surface, including recesses, more completely. Deposition will take place first on the high current density areas, which thus become polarized. This results in the distribution of current to other parts of the surface. Further application of this principle is the basis of the strike bath, as in silver plating, or the copper strike on steel before nickel plating. In such baths, a low metal (ion) concentration and a high current density result in higher polarization, thereby providing better covering power. In this respect acid baths are generally poor, while the covering power of alkaline baths is usually good.

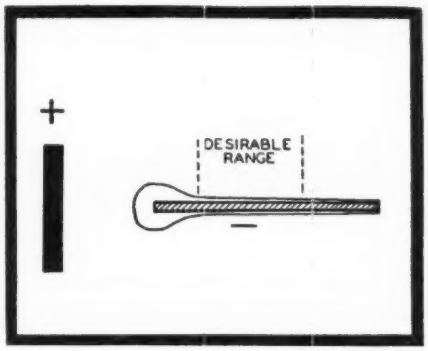


Fig. 101. Plating Range.

HULL CELL:

Covering power may be tested, in a qualitative manner, by plating on a cathode arranged so that the back of the plate serves as the low current density area (Fig. 99). A test plate will show, as in Fig. 100, that only part of the back of the plate (the low current density area) is covered. To cover the back of the plate completely, it would be necessary to increase the total current. This, in turn, would have the objectionable result of depositing excessive metal in the higher current density areas as well as possibly producing a burning effect. An adaptation of this method of determination is the standard plating test, whereby covering power may be measured in terms of the minimum current density at which plating will take place. If an anode and cathode are arranged, as in Fig. 101, such plate distribution may be shown. The current density changes continuously along the length of the cathode. Over a portion of this range, depending on the bath, the plate will be satisfactory.

The Hull cell provides an effective and rapid test plate, one which covers, in one operation, normal plating range

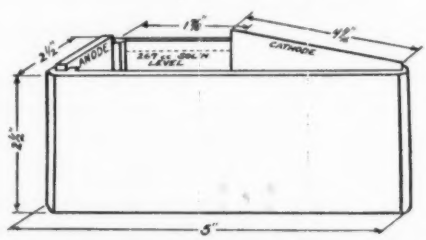


Fig. 102. Drawing of the 267-ml Hull Cell. All dimensions are for inside measurement.

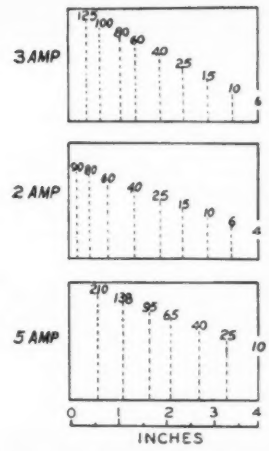


Fig. 103. Current-density zones in amperes per square foot on panels from 267-ml Hull Cell for three total currents.

plus a higher and lower current density range (Fig. 102). The extra range is the medium for checking or predicting trouble before it appears in the normal plating range. Fig. 103 represents the current density zones for this cell in amperes per square foot for 3 total currents.

BENT CATHODE — CAVITY SCALE:

Another commonly used method for measuring covering power is the bent-cathode test. The cathode, a rectangular metal strip, which is bent at right angles, thereby including recessed and protruding portions, is placed at a definite distance from the flat anode. The cathode is removed after a fixed period (1 minute) and the degree of metal deposition in the angle is studied. This method finds extensive use in measuring, at a definite current density, the covering power of chromium plating solutions. The best known type of testing specimen for this bath is the L shaped form (Fig. 104), which was used by Pinner and Baker to estimate the covering power of chromium plating solutions and to modify the CrO_3/SO_4 ratio. This method, however, is only qualitative, since such factors as the anode-cathode distance is not definitely determined, the fillet radius of the apex angle has not been considered, and current distribution on the vertical and horizontal planes of the cathode is not the same. The distribution

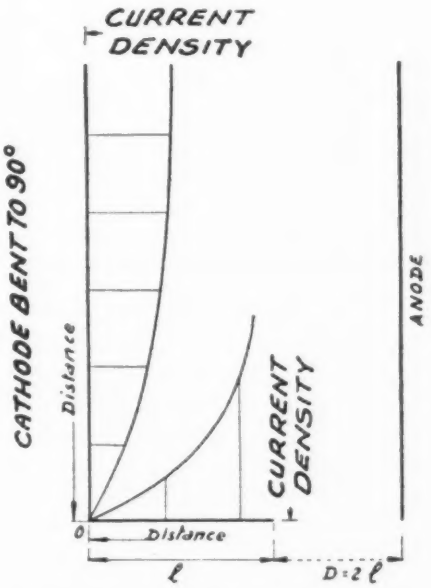


Fig. 105. Current distribution on cathode bent to right angle.

on the vertical part of the cathode becomes more uniform, the farther it is from the angle whereas, on the horizontal part of the cathode, a rapid rise occurs. This is demonstrated effectively in the graph, Fig. 105, according to Kasper.

BENT CATHODE IN HULL CELL:

The development and standardization of an improved method of evaluating covering power was described by R. H. Rousselot in the May 1955 issue of METAL FINISHING. In this procedure the cathode, bent at an angle of 78°, is placed in a Hull cell which serves as a standard cell. Because of the fixed dimensions of the cell, the combined advantages of an angular cathode and bent cathode are included. The slanting cathode provides a quantitative evaluation of current densities, while

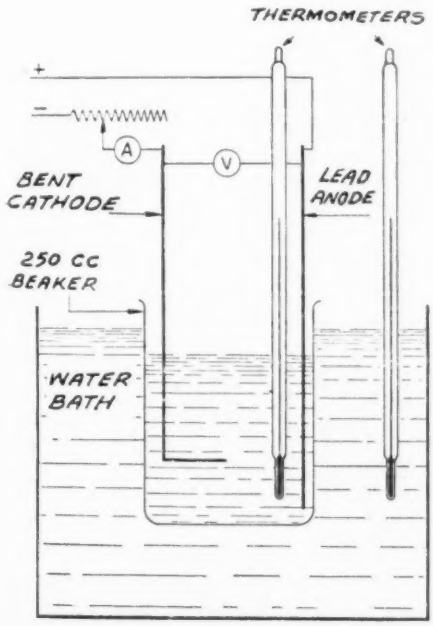


Fig. 104. Design of test with bent cathode as given by Pinner and Baker.

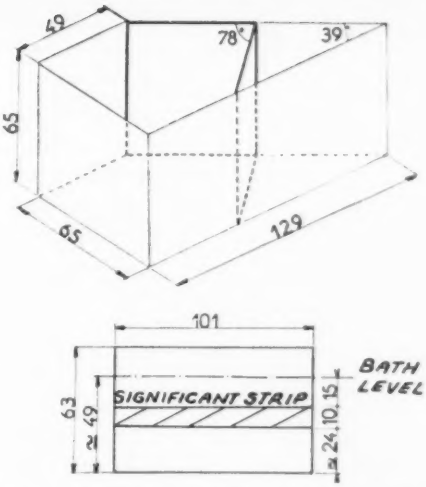


Fig. 106. 270 cc. Hull Cell with bent cathode, showing significant strip on the cathode.

the form of the bent cathode provides areas intended to receive low current densities. A schematic arrangement for this test method is shown in Fig. 106. To make the test quantitative, a copper fluoborate bath was used to determine the distribution of the current along the shanks of the cathode. This solution was used because it had almost zero polarization and 100 percent cathode efficiency up to very high current densities. Fig. 107 is the graph for this curve. A total current of 4 amperes was used because it corresponds to average density of 8 amp./dm.^{2} commonly used in chromium plating. Measurement along the significant strip shown in Fig. 106 is necessary for a quantitative determination of the covering power. The fillet radius of the apex is 0.5 mm, the test run, 3 minutes.

The Cavity Scale test for measuring covering power gives semi-quantitative values for determining the ability of a solution to deposit in recessed portions of a cathode. It consists of a bar of

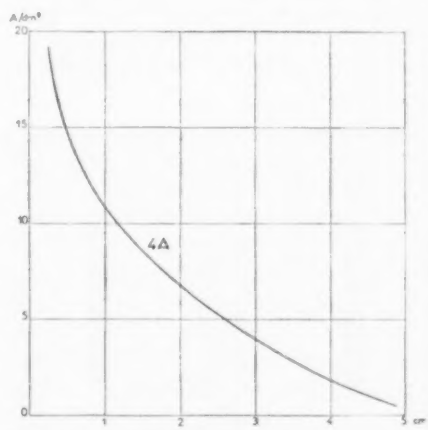


Fig. 107. Curve showing distribution of current along bent cathode placed in Hull Cell. (Only one-half of curve, 0 to 5 cm, is shown, the other half being symmetrical.)

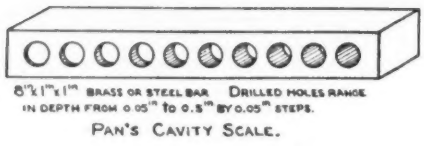


Fig. 108. Pan's Cavity Scale.

metal containing a series of holes of the same diameter but of varying depths (Fig. 108).

Current Distribution

Distribution of the metal deposited upon an object will depend upon the current density, which varies over different parts of the surface as a result of electrode geometry. This includes such factors as shape and size of cathode and anode; position of plated object relative to anodes, tank walls, other cathodes; auxiliary anodes which aid in increasing the thickness of deposited metal in thin areas; auxiliary or secondary cathodes which tend to reduce (rob) the current in high current density areas (Fig. 109); or non-conducting shields, which will shadow high current density spots, thus shifting the deposit to other areas (Fig. 110). Thus, the distribution of current on the electrodes under an applied potential and in the absence of polarization is called the *primary current distribution*. In some simple cases it can be obtained directly by calculation, but it becomes impossible in the majority of cases. It is independent of resistivity or other solution properties, depending entirely on the shape and position of the electrodes.

EQUIPOTENTIALS:

The simplest arrangement for an electrolytic cell in which current will flow only in straight lines between electrodes, thus permitting uniform current distribution, is represented by Fig. 111. This type of cell will consist of a single anode. In such a unit, obeying Ohm's Law, the amount of current flow will be in direct proportion to the voltage (potential difference) and inversely proportional to the resistance of the solution. The current density, assuming no polarization, would not change, if either electrode became one of the plane surfaces marked 1, 2 or 3 in Figure 111, and the applied voltage were adjusted to conform with the shorter distances. Such plane surfaces are called equipotentials and are determined by cell geometry.

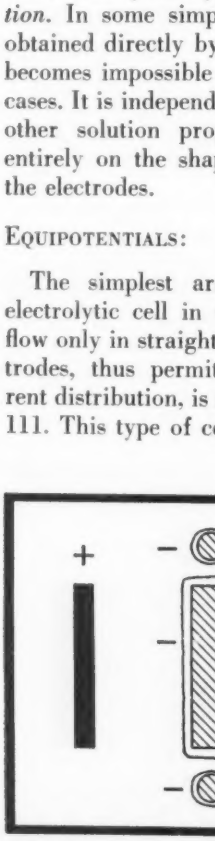


Fig. 109. Robbing.

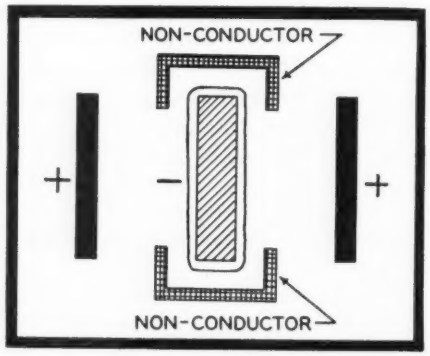


Fig. 110. Shadowing.

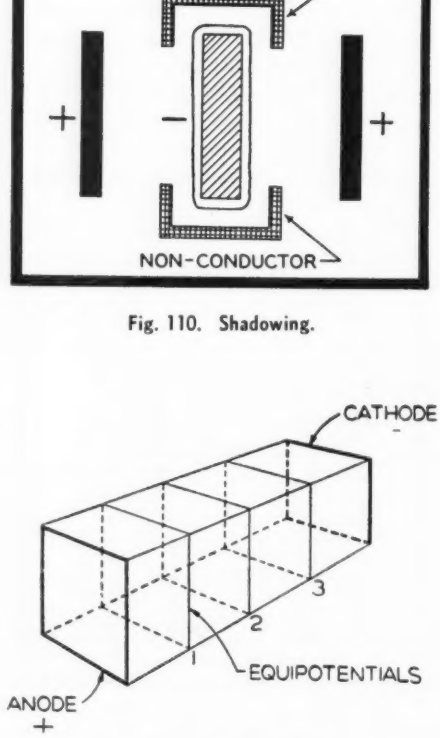


Fig. 111. Electrolytic Cell.

SECONDARY CURRENT DISTRIBUTION:

Polarization, which produces a local back emf, resulting from chemical and electrochemical reactions occurring in the cell, has the same effect as increasing the resistance in the higher current density areas. This reduction in current density results in a more uniform current distribution on an electrode. The term uniformizing is used to describe this effect. This factor, which includes the effect of polarization upon throwing power, is called secondary current distribution. It is dependent on such additional conditions for current distribution as the nature of the basis metal, current density, conductivity, cathode efficiency, temperature, and agitation.

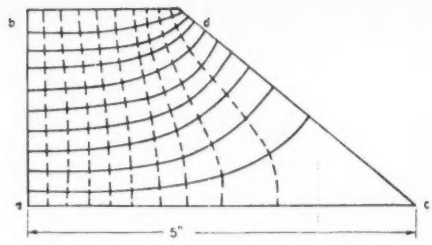


Fig. 112. Electric current field in Hull Cell. Electrodes ab and cd are connected by (solid) current lines; equipotential lines are dotted.

CURRENT LINES:

Current lines are always at right angles (perpendicular) to the equipotentials. In the diagram of the Hull Cell (Fig. 112), the relationship of current (flow) lines to equipotentials is indicated. The cathode, cd, is inclined, and it will be observed that the equipotentials (dotted lines) are closer near d than near c, thus producing a higher current density at d compared to c. This difference is reduced as the equipotential surfaces are shown farther away from cd and begin to appear parallel as electrode ab is neared. Such equipotential lines will give values that will be between those obtained when the electrode ab and cd are used as anode and cathode respectively. The current lines (solid) are those paths along which the ions flow and are always at right angles to the equipotentials irrespective of the position or arrangement of the electrodes. This provides a graphical method of locating the current (flow) lines.

The value of an equipotential surface may be determined by using a probe (exploring) electrode and a voltmeter. A recent development in the determination of equipotential lines by use of models was described in an article in the April, 1954 issue of PLATING by G. F. Kinney and J. V. Festa. They used a model of an actual cell in which

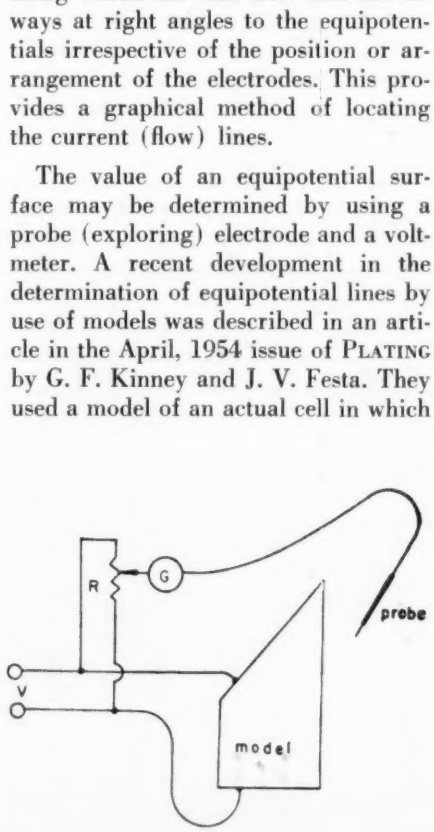


Fig. 113. Locating equipotential lines.

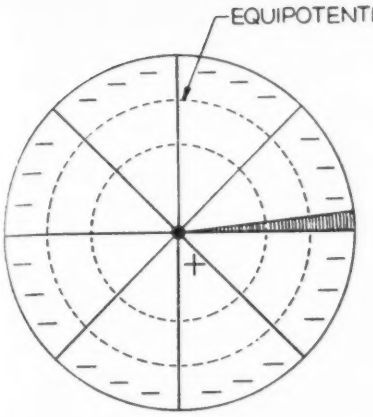


Fig. 114. Cylindrical electrolytic cell, in which the outer cell wall is the cathode and the center indicates a thin wire electrode.

conducting paper was used to simulate the plating solution. The electrodes consisted of low-resistance silver painted strips (printed circuit type). After the equipotential lines were plotted, the current (flow) lines were drawn in. The schematic circuit for locating equipotential lines is shown in Fig. 113. In an alternate method of locating the network of current (flow) lines, described in this article, an inverted model is employed in which the conducting electrodes of the original model are replaced by non-conducting areas and the non-conducting areas are replaced by conducting areas. It is evident that the current lines, shown originally, now become equipotential lines and may be located by the probe method.

Another arrangement (geometrical) of electrodes for obtaining uniform current distribution is a cylindrical conductor in which the cathode is the outer wall of the cylinder and the anode a thin wire at the center (Fig. 114). The bottom is insulated. The equipotentials are represented by circular (concentric) cylinders drawn as dashes. The radial lines shown in the diagram are current lines along which the ions of the electrolytic move. It is evident that if the eight sections through which the total current passes are continually reduced, a small section, as indicated by the heavy lines, will result, with the current lines becoming, ultimately, radial lines. The current density, although uniform on each cylinder of any of the cathode surfaces, will become higher, owing to the smaller areas, as the inner circles are reached. Accordingly, the current density on the cathode will be inversely proportional to the radius.

Flat and Bent Cathode:

Current distribution will not be uniform in the case of flat and bent cathodes, which may be considered the general classification of electrodes when determining variations in metal distribution on cathodes. Schaefer and Pochapsky showed the metal distribution of nickel, which was plated in a uniform-current cell, from a Watt's bath on a flat cathode with sharp edges. The actual (experimental) metal deposition compared favorably with the theoretically calculated distribution. The throwing power of the nickel bath is almost zero; hence with virtually no polarization, metal distribution in the cathode will follow the theoretical primary distribution curve. This condition wherein the edge effect (deposition) is greater than the center part, prevails for any sharp edge. J. Kronsbein stresses the fact that the edges use or steal the current density from center part of the plate.

In studying the metal distribution on interior surfaces of right angle cathodes for different shank lengths and fillet radii, Kronsbein and his associates reported that the fillet radius had little effect on thickness of deposit in the corners or shanks of the specimens when the radius was greater than 0.02 inch for a two inch shank length. This is recommended as the minimum measurement for objects to be plated using the uniform-current cell. Below this 0.02 inch radius, deposition of metal in the fillet decreased rapidly. This applies to angle-shaped objects that are closely spaced in a large tank, with the anodes eight to twelve inches from the cathodes.

Throwing Power Determination

Because of the many variables associated with electrodeposition processes, the use of a specific test for determining and expressing throwing power numerically (in percentage) cannot be considered as a quantitative measure for metal distribution on a particularly shaped cathode in a tank. For that reason, a procedure which would not distinguish between such contributing factors as conductivity, cathode polarization, primary or secondary current distribution, and cathode efficiency, but would serve as a direct measure of the metal distribution, is preferred. Such an arbitrary value could be considered the throwing power of the solution.

Haring Cell:

The method generally considered most satisfactory for expressing throwing power is the one developed in 1923 by Haring and Blum, commonly known as the Haring Cell (Fig. 115). In construction, it is made of hard rubber or glass or, at times, a glass-lined steel box, 15 cm. long, 5 cm. wide, with a solution depth of 5 cm. Sheet metal cathodes fit in both ends of the box and are connected by a metal rod. A perforated or wire gauze electrode serving as the anode may be placed at distances of 2.5, 5.0 or 10 cm. from one of the cathodes. The gauze or perforated electrode reduces polarization on both sides of the anode. The ratio of distances between the cathodes and the anodes is designated as K. This represents the primary current distribution ratio. The ratio of the gain in weight of the near cathode (Mn) to that of the

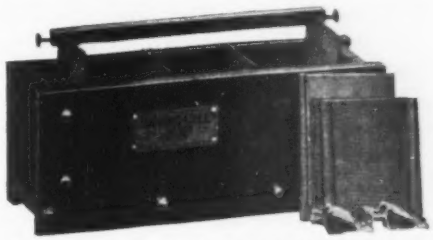


Fig. 115. The Haring Cell, showing gauze anodes in two of the three possible positions. The other position is in the slots halfway between the right hand gauze anode and the cathode.

far cathode (Mf) is called the metal distribution ratio and is indicated by the letter M or $\frac{Mm}{Mf} = M$, metal distribution ratio. From these figures, Haring and Blum defined throwing power as the deviation (in percent) of the metal distribution ratio from the primary current distribution ratio or Throwing Power $= 100 = \frac{K\text{-}M}{K}$. For example, if the cathode distance ratio, K, is 5, that is if the anode is five times as close to one of the cathodes as it is to the other, a solution which exhibits no throwing power will deposit five times as much metal on the nearest cathode compared to the deposit of metal on the far cathode. Since the metal in ratio M, in this example, will be 5 then, by substitution, $Tp = 100 \times \frac{5\text{-}5}{5} =$ zero percent. If in another instance, the weight of the deposited

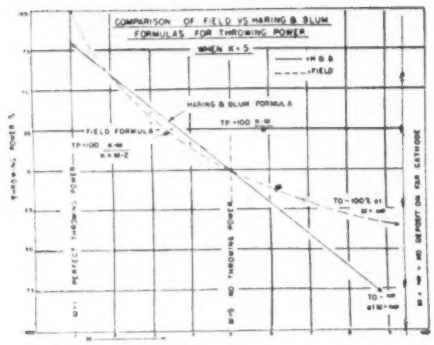


Fig. 116. Throwing power vs. metal ratio of K = 5 by the Haring-Blum and Field formulas.

metal in the near cathode will be four times the weight of metal on the far cathode, the throwing power will then be $Tp = 100 \times \frac{5-4}{5} = +20$ percent, indicating a more uniform metal distribution. The throwing power in this case is said to be positive. By the same procedure, a metal distribution ratio (M) greater than 5 will result in a negative throwing power value. An objection raised to the use of this formula is its dependence on the value of K. Since perfect throwing power would indicate a metal distribution ratio equal to 1 then, when K = 5, the formula would show less than 100 percent throwing power. In this instance it would be 80 percent. ($TP = 100 \times \frac{5-1}{5} = 80$ percent). If K = 2, then substitution in the equation would imply a throwing power of only 50 percent.

FIELD MODIFICATION:

An improved scale was considered necessary so that perfect throwing power would be represented by a numerical value of 100 percent, one which would vary very little with changes in distance ratio (K). One modification is the Field equation in which the throwing power is always 100 percent when M = 1. $Tp = 100 \times \frac{K-M}{K-M-2}$. It is entirely independent of the value of K and all values lie between +100 percent and —100 percent. The graph (Fig. 116) shows the comparison of throwing power values and the metal ratio of K = 5 for both formulas.

A simplified throwing power device which can be introduced directly in a plating tank (Fig. 117) was reported by F. A. Lowenheim in the 41st Ann. Proc. of the A. E. S. It has the advantage of testing the throwing power directly in the tank instead of using a laboratory set-up. Weighing the cathodes before and after represents the only procedure necessary. The cathodes are spaced so that the distance ratio (K), as the measurements show is 5/1.

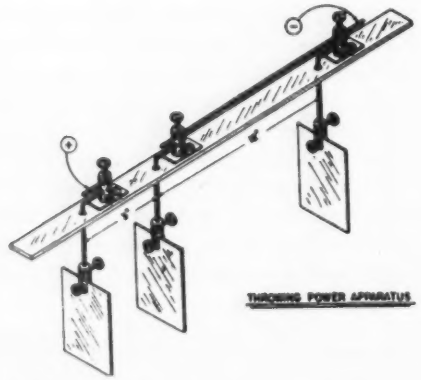


Fig. 117. Simplified throwing power apparatus.

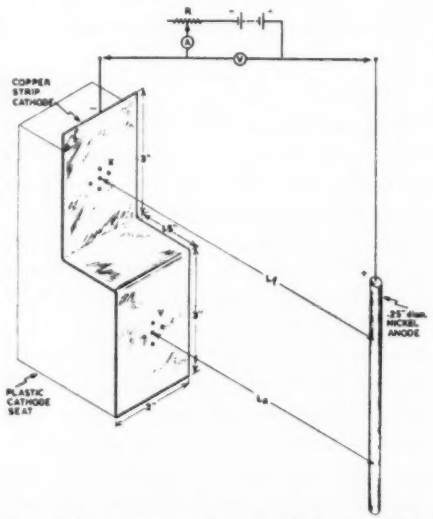


Fig. 118. Diagram of a double-lead cathode arrangement used for throwing power determination.

A modification of the Haring Cell which, R. Pinner contends, gives throwing power values closer to those obtained in plant operation is the double-bent-cathode test (Fig. 118). In this arrangement the two vertical faces of the cathode strip are made parallel to the anode by forming an additional right angle bend. The letters L_m and L_f represent the anode-cathode distances. The significant advantage of this method, the author states, lies in overcoming possible differences in temperature and metal concentration which may result when two cathode sections are arranged as in the Haring Cell, and in avoiding the effect of polarization on two separate cathodes, which may differ from that of a single cathode. A disadvantage arises from the difficulty in determining the current distribution ratio over the two faces. Also, the thickness of the deposit cannot be obtained gravimetrically. The claim is made, however, that this test is simpler and serves as a more effective indication of the effect of plating variables on throwing power.

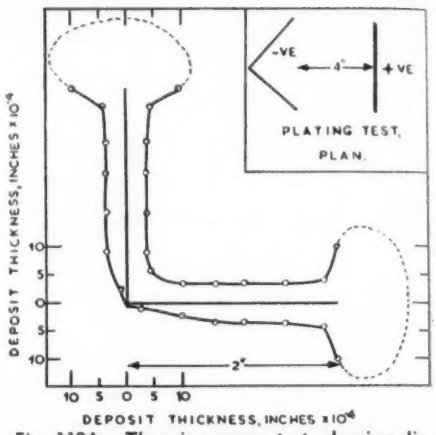


Fig. 119A. Throwing power test, showing distribution of deposit on bent cathode placed symmetrically with respect to anode.

An indication of the excellent throwing power and distribution of metal thickness over an irregular shaped cathode of a tin-nickel plate was reported by J. W. Culbertson, N. Parkinson and H. P. Rooksby in the March 1953 issue of JOURNAL OF THE ELECTROCHEMICAL SOC. Using bent cathodes placed both symmetrically (Fig. 119a) and asymmetrically (Fig. 119b) with respect to the anode, the results, measured quantitatively, show a quite constant thickness distribution with the exception of the deposit on the edges. Emphasis is placed upon the amount of alloy deposited on the far side of the cathode and the fact that the property of this solution is not common with electrolytic solutions.

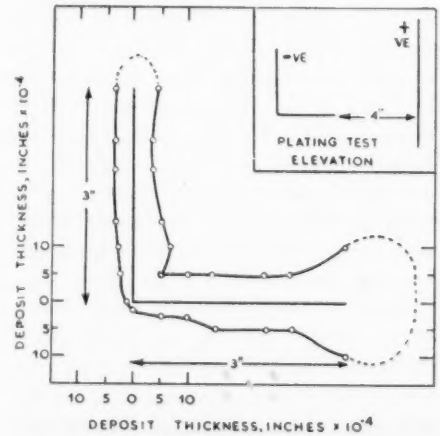


Fig. 119B. Throwing power test, showing distribution of deposit on bent cathode placed unsymmetrically with respect to anode.

SHOP PROBLEMS

ABRASIVE METHODS SURFACE TREATMENTS CONTROL
ELECTROPLATING CLEANING PICKLING TESTING

METAL FINISHING publishes, each month, a portion of the inquiries answered as a service to subscribers. If any reader disagrees with the answers or knows of better or more information on the problem discussed, the information will be gratefully received and the sender's name will be kept confidential, if desired.

Gold Plating Die Castings

Question: I would like the procedures on gold plating zinc die castings in relationship to the cleaners, acid dip, rinses and prior plating (preferably omitting nickel plating).

A. C. L.

Answer: The procedure for plating die castings would involve the following steps, after buffing:

1. Degrease
2. Electroclean in special die cast cleaner, obtainable from all cleaner manufacturers
3. Rinse, cold or warm
4. Acid dip, ½ fl. oz./gal. sulfuric acid
5. Cold rinse
6. Copper strike in standard cyanide bath
7. Bright copper plate
8. Rinse and dry
9. Buff copper
10. Clean, rinse, and cyanide dip as usual
11. Gold flash, as usual.

If a bright nickel is applied after bright copper plating, the articles can then be gold plated directly, thus avoiding the additional steps of buffing copper and cleaning. In addition, the use of a nickel undercoat for gold eliminates tarnishing of the copper through the thin gold deposit.

Film Removal from Hardened Steel

Question: We have encountered considerable difficulty in removing fire scale from some of our sheet metal screws before plating. We have experimented with numerous suggestions from our various chemical suppliers. However, we have not been able to correct this situation.

The peculiar part of this is that in a barrel run, we will come up with some very beautiful plating, but, invariably there will be a small percentage that comes out as per samples enclosed.

We would greatly appreciate any suggestions that you may offer informing us as to whether or not this deposit is a fire scale or any other information at your disposal.

C. J.

Answer: The deposit is not really a fire scale but a film of insoluble iron carbide. This condition is quite common on hardened steel because of the high carbon content.

On large parts it is customary to pickle sufficiently to loosen the film and then to brush it off. This, of course, is not possible on small parts such as the sheet metal screws forwarded. Our suggestion would be to pickle the screws for a longer period, using a pickling inhibitor to prevent attack. Subsequent tumbling in dry sawdust may result in removal of the skin.

Trichlorethylene Degreasing

Question: We have two questions to ask you: In solvent degreasing, how much trichlorethylene is normal to lose by vaporization; and what is the maximum oil content allowable in the liquid trichlorethylene?

S. S.

Answer: There is no standard figure for solvent consumption in vapor degreasing. The losses will vary with the type of work, the type of machine and the method of operation. Slow removal of work through the vapor chamber, however, is very important to cut down losses.

The boiling point of trichlorethylene rises with increase in oil concentration. Normally, when the temperature reaches 195 deg. F., indicating 25% by volume oil content, the solvent should be distilled away and the sludge removed from the boiling compartment.

Electrotin Flowing

Question: We need information about the method of brightening electrotin plating by "reflowing" in hot oil. The information we need is what oil, or mixture of oils, do we need, and at what temperature should the oil bath be operated? We, of course, need any information you may have on any special techniques needed to do this operation.

R. W. B.

Answer: Electrotin is flowed by immersion in hot palm oil, tallow, or a number of proprietary flowing oils, obtainable from oil refiners. A suitable product is furnished by Hydro Chem. Co., Inc., Farmington, Conn., Ironsides Co., Columbus, and by Archer-Daniels-Midland Co., Cleveland, Ohio. The oil bath is operated just above the melting point of tin, generally 460-500 deg. F.

Plating on Plaster of Paris

Question: I am plating copper from an acid copper bath onto a plaster of paris plaque. The copper film which is plated onto the plaque blisters in various locations. The plaster of paris also is soaked with water after the plating operation. The following are the steps which I follow:

1. Air dry plaque for 2 to 4 days.
2. Apply two coats of either lacquer or shellac.
3. Spray two coats of a mixture of
   1 part lacquer
   4 parts lacquer thinner
   Bronzing powder
4. Dry plaque 24 hours
5. Place in copper sulfate bath and plate direct for one minute and reverse for 15 seconds. Continue for ten hours.

Please inform me if the above steps are correct and how I can eliminate

the blistering and soaking of the plaque.

S. F. C.

Answer: Since the plaster of paris is water soaked after plating it would indicate that the waterproofing is not complete. It will be necessary to apply a sufficient number of coats of lacquer or shellac to make the plaster completely waterproof prior to plating. Better results will be obtained if the parts are soaked in hot paraffin wax. When bubbling stops, showing that the pores are filled, the part is removed and the excess wax wiped off with solvent.

If wax is used for waterproofing, at least two coats of shellac, and preferably more, should be applied before the bronzing lacquer. Shellac must be used since lacquer will penetrate the wax and will not dry.

Contact and Immersion Deposits

Question: On page 413 of the 1956 METAL FINISHING GUIDEBOOK, I noticed that you differentiate between a "contact" process and one that is a true immersion deposit. What is the chemistry of a "contact" process?

My reason for asking is that we have been able to deposit a metallic film by immersion without following the electromotive series. We feel that the "contact" process might explain our experiments.

Have any metals ever been deposited by immersion without following the electromotive series?

D. S.

Answer: An immersion deposit is produced by displacement of a metal from solution by a less noble metal, such as in the case of copper on iron from the copper sulfate solution.

In contact plating, an internal battery is produced by contacting the metal to be plated with a less noble metal. In this instance, the latter dissolves as the anode and the resulting current deposits the coating metal on the article to be plated. An example would be the deposition of tin on steel from the tartrate bath, using mossy tin or zinc as the contact metal.

Metals can be deposited without following the electromotive series, by chemical reduction. Electroless nickel and silver mirror production are typical examples.

Oxide Finish for Chromium

Question: We are interested in a product suitable for applying to chromium plated steel articles to obtain a chromium oxide by chemical means or by chemical plus heat. This might be in the field of dichromate solutions, etc.

W. K.

Answer: If the chromium deposit is sufficiently heavy, a good black can be produced in a case-hardening melt. A typical composition was patented by Du Pont in 1933 and is now in the public domain. It consists of:

30% sodium cyanide
30% sodium chloride
39% soda ash
1% sodium cyanate

Parts are dipped for 2 minutes at 1,400 deg. F. and quenched in cold water. The color can be brightened by oiling.

If the chromium plated parts cannot withstand this high temperature, a black deposit can be obtained by chromium plating from the acetate bath suggested by M. F. Quaely in the 1953 annual proceedings of the American Electroplaters' Society.

Silver Plating

Question: Would stainless steel be satisfactory for anode baskets in NaCN silver plating solutions? What is the highest voltage which can be used in a silver strike?

A. J.

Answer: Stainless steel is satisfactory for anode baskets in cyanide plating solutions. However, ordinary carbon steel is also satisfactory and less expensive.

A strike voltage of 4-6 is generally recommended for silver, but higher voltages are employed in special cases.

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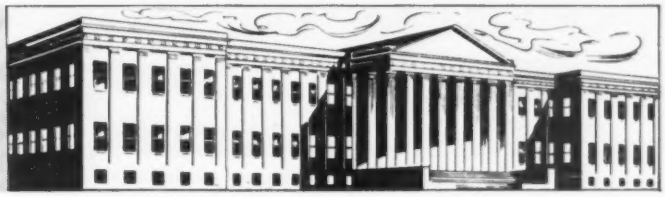
Patents

RECENTLY GRANTED PATENTS IN THE METAL FINISHING FIELD



Electropolishing Bath

U. S. Patent 2,752,304. *June* 26, 1956. *E. E. Darmois and I. Epelboin, assignors to Centre National de la Recherche Scientifique.*

Electrolytic bath for polishing metals constituted solely by a solution of a salt of perchloric acid in ethyl alcohol, said solution comprising from 80% to 92% of ethyl alcohol by weight, cation of said salt satisfying the inequality $r_s > r_c$ in which r_s is the radius of the cation in the said solution, and r_c is the radius of the cation as determined by measurements made upon the salt in the crystalline state.

Electropolishing Aluminum

U. S. Patent 2,752,305. *June* 26, 1956. *H. L. Turner, assignor to Union Carbide and Carbon Corp.*

A process for producing a smooth, lustrous surface on an article of aluminum or an aluminum-rich alloy, said process comprising immersing said article in an electrolyte, said electrolyte comprising, by weight, 45% to 80% phosphoric acid, 5% to 20% sulfuric acid, the total of the acids being not more than 90% of said electrolyte, 1% to 5% in the aggregate of at least one of the phosphorus containing material in the group consisting of a phosphoric acid ester of a polyhydric alcohol and a salt of said ester, the remainder water, etching said article in said electrolyte, and, subsequently, subjecting said article to a direct current voltage while making said article an anode in said electrolyte.

Barrel Finishing

U. S. Patent 2,752,732. *July* 3, 1956. *L. M. Walker.*

In apparatus of the class described, a main housing; a workpiece tumbling barrel rotatably mounted in said housing, said barrel having open mesh sides; an impeller mounted for rotation beneath said tumbling barrel, and positioned for hurling a stream of pulverulent material upwardly at said barrel; an impeller casing for partially enclosing the region of movement of said impeller, such casing having an open top region and including two side plates on opposite sides of the plane of rotation of the impeller, each plate having an opening near the lower level of the path of movement of said impeller through which such material is fed into such casing and thus from the side of the impeller into the path of impeller movement; primary hopper means for holding such pulverulent material and guiding same through such side plate openings into such casing; secondary hopper means above said primary hopper means and also positioned at one side of said impeller but below said barrel into which falls such material after being thrown toward said barrel, such secondary hopper means having outlet means for directing material from the side thereof into the path of movement of such rotatable impeller from the side thereof, and also having inclined hopper surfaces of selected inclination for permitting such material to accumulate in a selected amount prior to sliding through said outlet means.

Belt Polishing Machine

U. S. Patent 2,752,734. *July* 3, 1956. *A. S. McGibbon, assignor to Lukens Steel Co.*

In a machine for the surface conditioning of a work piece such as a substantially flat plate or the like: an endless rotatable belt for performing a conditioning operation on the said piece; at least one roller, the outer surface of which is adapted to contact one face of the belt to provide means for engaging said belt and said work piece; supporting structure for said roller controllably mounted for universal movement over the surface of said work piece and having mechanism accommodating tilting motion of the roller in a plane substantially perpendicular to the work piece; resilient means to yieldably restrain said swinging movement; and means to rotate said belt.

Steam-Cleaning

U. S. Patent 2,753,212. *July* 3, 1956. *G. J. Aultman.*

A self-contained steam generator comprising in combination, a heater having a water impervious surface adapted to be heated to a temperature sufficient to vaporize water, a steam jacket enclosing said heater and having an inlet and an outlet, said inlet being disposed above the heater and adapted to direct water onto the heater surface thereof, a closed water reservoir disposed above the jacket for gravity feed of water thereto, means for selectively supplying water to said reservoir, a conduit establishing communication from the top of said reservoir at a predetermined water level to the jacket inlet and coacting therebetween as a trap to isolate the jacket from the reservoir when the supply of water is removed and the static level of the water in the reservoir drops below said predetermined level, a nozzle having a restricted orifice coupled to said jacket outlet and adapted to form a relatively high velocity jet of steam, and means for independently introducing a fluid cleansing agent at the point of release of the steam from said nozzle.

Plating Silvered Mirrors

U. S. Patent 2,753,298. *July* 3, 1956. *W. R. Gray, assignor to Pittsburgh Plate Glass Co.*

The method of electroplating a metallic protective layer upon the silvered surface of a mirror, comprising passing a silvered sheet of glass continuously in a substantially horizontal plane beneath an anode plate extending crosswise of said sheet and being of substantial width as measured in the direction of sheet travel, the silvered surface of said sheet facing said anode plate and being closely adjacent the same, continuously flowing plating solution into the space between said sheet and said anode plate only in sufficient quantity to maintain a constantly changing unbroken single thin layer of solution filling the space between the

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anode and the sheet, and passing a plating current from said anode plate through said layer of solution and into the silver surface.

Electropolishing Copper

U. S. Patent 2,753,301. *July* 3, 1956. *F. C. Bersworth, R. F. Atwood and N. J. Bicknell, assignors to The Dow Chemical Co.*

The method of electropolishing the surfaces of articles composed of copper and copper base alloys, which comprises making the article an anode in an aqueous electrolytic bath consisting essentially of an alkali metal salt of an alyklene polyamine carboxylic acid, an inorganic acid in an amount establishing a pH of about 4 in the said aqueous solution, and a non-electrolyte, and passing an electric current through the solution under such conditions of current density, solution temperature, time and agitation, as to clean and polish the said surface electrolytically and to cover the polished surface with a thin polarizing oxide film layer to impart corrosion resistance to the polished surface.

Abrasive Blasting System

U. S. Patent 2,753,664. *July* 10, 1956. *R. R. Garver, assignor to Pangborn Corp.*

In an abrasive blasting system including a source of abrasive material under pressure, a blastant nozzle connected to said source of abrasive material, a fluid-pressure actuated supply valve mechanism interposed between said source of abrasive material and said nozzle, said valve normally closing communication between said source of abrasive material and said nozzle, a conduit having one end positioned adjacent said nozzle and having its opposite end connected to an electrical switch, said electrical switch being normally maintained in its open position and being adapted to be closed by fluid pressure, said switch being provided in an electrical circuit for operating a pair of solenoid valves, one of said solenoid valves being normally open and the other of said solenoid valves being normally closed when said switch is in its open position, and being movable to their opposite positions when said switch is in its closed position, said solenoid valves being in fluid connection with said supply valve to maintain said supply valve in its normally closed position when said switch is open and to open said supply valve when said switch is closed, a control valve positioned adjacent said nozzle and adapted, when closed, to effect an increase of fluid pressure on said switch, means biasing said control valve to its open position, and manually operative means for closing said control valve.

Gold Alloy Plating

U. S. Patent 2,754,258. *July* 10, 1956. *S. C. Taormina, A. T. Marinaro, and L. Packman, assignors to Platers Research Corp.*

An electroplating cyanide bath containing water, 4 grams per liter of fine gold, 15 grams per liter of free potassium cyanide, 4 grams per liter of potassium molybdate, 7½ grams per liter of potassium hydroxide.

An electroplating cyanide bath containing water, 4 grams per liter of fine gold, 30 grams per liter of potassium carbonate, 15 grams per liter of free potassium cyanide, 4 grams per liter of uranium nitrate.

Porcelain Enameling

U. S. Patent 2,755,210. *July* 17, 1956. *F. G. Sutphen, J. J. Canfield, R. L. Myers, J. E. Sams and R. S. Burns, assignors to Armco Steel Corp.*

A process of increasing the adherence characteristics of an iron or mild steel stock or article intended for coating with porcelain enamel, which pro-

cess comprises in the order named the steps of depositing upon the surface of the stock or article a material chosen from a class consisting of nickel, cobalt, mixtures of the two, and alloys rich in nickel, cobalt, or both, subjecting the stock or article to a scale anneal comprising subjecting the stock or article to heat in an atmosphere no less oxidizing than an atmosphere of burned natural gas containing 11% combustibles based on dry gas analysis and having a dew point of 150°F., in a furnace at temperatures of substantially 1,400° to 2,000°F. for a time of substantially 2 to 5 minutes, whereby to produce a distinct scale, and then acid pickling the article at least to the extent of removing the scale from the surfaces thereof.

Sealing Anodized Aluminum

U. S. Patent 2,755,239. *July* 17, 1956. *W. Glauser, Z. Zurich and M. Keller, assignors to J. R. Geigy A.-G.*

In a process for sealing the oxide coating of anodically oxidized aluminum, the improvement which comprises subjecting the anodically oxidized aluminum to the action of a hot water sealing bath in the presence in the bath of a water-soluble formaldehyde condensation product of an aromatic sulphonic acid and of ions selected from the group consisting of nickel and cobalt ions.

Chromium Plated Aluminum

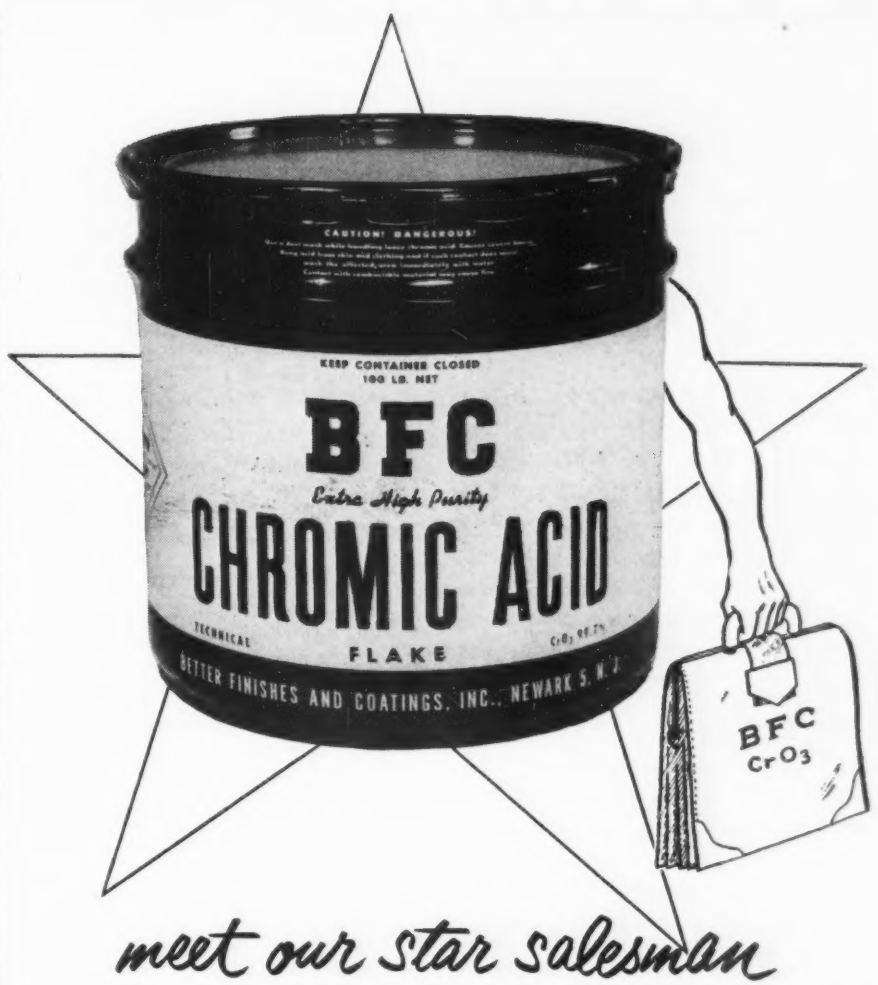
U. S. Patent 2,755,242. *July* 17, 1956. *F. Keller and W. G. Zelley, assignors to Aluminum Co. of America.*

A method of improving the resistance to corrosion of an aluminum article having a porous chromium electroplate comprising making the article anode, at a potential of at least 5 volts, in an aqueous solution consisting essentially of water and up to 1 gram per liter of chromic acid, for a period of at least ¼ of a minute.

Electroplated Article

U. S. Patent 2,755,537. *July* 24, 1956. *C. F. Smart, assignor to General Motors Corp.*

A metallic structure comprising a metal base, a first layer of a metal selected from the class consisting of lead, indium, and an alloy of lead and indium, a second layer of an alloy containing lead and antimony and a third layer of antimony, the thickness of the first layer being from 0.00001 to 0.0001 inch, the thickness of the second layer being from 0.0005 to 0.0015 inch and the thickness of the third layer being from 0.0005 to 0.0015 inch.



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Hot Dip Aluminum

U. S. Patent 2,755,542. *July* 24, 1956. *A. L. Boegehold, assignor to General Motors Corp.*

The process of forming a structure highly resistant to oxidization at elevated temperature which consists in copper brazing together a plurality of ferrous metal parts to provide an assembly of ferrous metal parts having exposed copper brazing material between the ferrous metal parts, preheating the assembly to a temperature at least as high as the melting point of aluminum in a salt bath consisting substantially as follows:

37 to 57% KCl
25 to 45% NaCl
8 to 20% Na_3AlF_6
0.5 to 12% AlF_3

said fused salt being activated to aluminum in contact therewith, and then immersing the heated assembly in a molten aluminum bath for a short time to obtain an aluminum coating joined both to the ferrous metal and exposed copper brazing material of the brazed assembly by an alloy bond having a thickness of about .0002 to .0005".

ABSTRACTS

Reaction Mechanism of Non-Electrolytic Nickel Plate

K. M. Gorbunowa and A. A. Nikiforowa: *Shurnal Fisitscheskoi Chimii* (Journal Physical Chemistry—Russia). Vol. 28, No. 5, p. 897.

The most important step of this process is the reaction:

$$NaH_2PO_2 + H_2O = NaH_2PO_3 + 2H$$

which is catalyzed by nickel and palladium. The atomic hydrogen which is formed partly reduces nickel ions to nickel, partly hypophosphite to phosphorus, the rest escaping after combination to molecular hydrogen. The net result is that the nickel yield, in all the tests conducted, did not exceed 38.6% with ratio to the reacted hypophosphite. A reduction of cobalt salts, similar to the nickel reaction, is only possible in alkaline solutions.

Electropolishing of Aluminum

M. G. Gupta and G. Joshi: *Journ. Proc. Inst. Chemists* (India). Vol. 26, p. 87.

A series of baths was developed for the electropolishing of aluminum sheet, the composition of the metal being 0.28 Si, 0.42 Cu and 0.40 Mn. The best polishing results were obtained with the following bath:

H_3PO_4 (1.74)	1750 cc.
C_4H_9OH	435 "
H_2O	210 "
Temperature	40 - 50°C.
Current density	4.5 amp./sq. dm.
Voltage	14 - 38 volts
Time	about 15 minutes.

The reflectivity achieved on the aluminum was 81.6% as compared with 68.5% obtained on the same material with mechanical polishing.

Control of Chromium Baths

M. Straschill: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 2, p. 61.

For the operational control of chromium baths, the author variously deals with the chromic acid content, and trivalent chromium. Details of the analyses, preparation of the test solutions, and methods of conducting the tests are given. An indication of the presence of considerable amounts of trivalent chromium in the bath will be given by a difference between the chromic acid which should be present by addition and that found by analysis. Trivalent chromium content is determined by oxidation and ascertaining the chromic acid formed. The chromic acid already in the bath is co-titrated with this determination. Deduction of the amount of the bath chromic acid, will give the required figure for the trivalent content.

Cyanide Copper Baths

W. Briese: *Metallwarenindustrie und Galvanotechnik*. Vol. 45, No. 2, p. 65.

The author considers the various cyanide copper plating baths, including the high speed baths, mainly from the practical aspect, discussing the working conditions and the best manner of operation to secure trouble-free results. The high-speed Rochelle salt baths do not need a brightening agent and, when correctly operated, nickel can be plated directly on the copper. These baths are fairly easy to maintain at constant composition. The sodium cyanide make-up is also low. Thus, for example, with a barrel copper bath for zinc die castings, it was found that, for each 1,000 liters, it was only necessary to add daily 1-2 g./l. sodium cyanide. Very smooth and fine-grained deposits are obtained from the Rochelle salt baths.

It has not been found possible to obtain true bright deposits of copper from any of the baths, but only semi-bright; this, however, is adequate for a direct application of bright nickel without polishing. In the normal, cold cyanide baths as well as with the hot Rochelle salt baths of the high speed type, iron, zinc, and zinc die castings can be coppered without pretreatment after a good cleaning. Zinc parts, after cleaning and rinsing, should be activated in a 20-30% sodium cyanide solution at a temperature higher than the following copper bath, then coppered without rinsing. Iron can also be activated in this way.

The anode surface of cyanide copper baths should be kept as large as possible to prevent passivation of the anodes. With warm and hot copper baths, the free cyanide content should be controlled daily. The free sodium cyanide determines the working characteristics of the bath to a large extent.

Theory of Hydrogen Ion Concentration

A. Ebert: *Ciba Rundschau* (Switzerland). No. 122, p. 4524.

A historical survey is given of the development of hydrogen ion definition. The work of Faraday, Hittorf, Kohlrausch, van Hofft. Arrhenius, Ostwald, Nernst, and Fernbach, are discussed.

Laws Governing the Change in Cathode Polarization During Deposition of Metals Under the Influence of Surface Active Additions

J. J. Matulis: *Istwestija Chimitscheskich Nauk* (Russia). No. 4, p. 577 (1954).

The author developed a compensation-oscillographic process for the measurement of dimensions and velocities of changes of the cathode polarization with whose aid there was investigated the influence of additions of simple mono- and dicarboxylic acids as well as primary alcohols on the cathode polarization in the electrodeposition of copper, silver, zinc, and nickel from electrolytes with current densities of 1-10 ma./sq. cm.

With copper, it was found that the cathode polarization grows in each case; the curve formed resembles an adsorption therm and the polarization changes, which are caused by homologic additions, obey the Traube law. The same law-conformity is attained with silver cathodes by acids, with zinc cathodes by alcohols, apart from ethyl and methyl alcohol; with nickel cathodes the results are influenced by hydrogen generation. Numerous curves and diagrams of the test data are given in the text.

Theory of the Possibility of Fine-Grained Deposition with Electrolytes of Complex Copper Salts

A. W. Ismailow and S. W. Gorbatschew: *Shurnal Fisistscheskoi Chimii* (Russia). Vol. 28, No. 9, p. 1529.

The nature of copper deposition from complex solutions was determined through the polarization. There can occur both chemical as also concentration polarization. With chemical polarization, the fineness of the deposited metal increases still further with in-

crease in the concentration; in addition, the nature of the polarization changes and the concentration polarization becomes the dominating influence. With this, the effect of the fine-grained deposition decreases so that there is an optimum concentration of the complex former.

Both types of polarization differ from one another also in the temperature dependency. Further, there is discussed the relationship between activation energy and fine-grained deposition.

Insulation (Masking-Off) in Plating Baths

W. I. Minenko. *Awtomobilnaja I Traktornaja Promyschlennost* (Russia). No. 10, p. 29 (1954).

The author discusses a process developed for the insulation and masking-off of articles in plating baths. The insulating compound used consists of a mixture of dibutyl phthalate, lead or zinc stearate, Igelite and a filming agent. The author gives a full description of the procedure for preparation of this insulating body, as well as the application of the insulating substance to the articles.

After plating, the insulating mass used for masking can be removed by means of gas burners, whereby the mass burns away and the metal surface is left.

Influence of Foreign Ions on Copper Deposition Potential

W. W. Michailow: *Shurnal Fisitscheskoi Chimmi* (Russia). Vol. 28, No. 6, p. 1067.

The copper deposition potential is influenced by foreign ions. This action is confined to cations. Some ions, such as potassium and magnesium, push the potential towards the positive side; others, for example lithium, sodium, and beryllium, towards the negative. Two possibilities are discussed for an explanation of this. First, the foreign ions adsorbed on the cathode facilitate or retard the discharge of the copper ions; on the other hand, there can be assumed a fluctuating action between the copper ions which are already present at the cathode surface, with the foreign ions of the solution.

Surface Quality of Brass Sheet and Strip

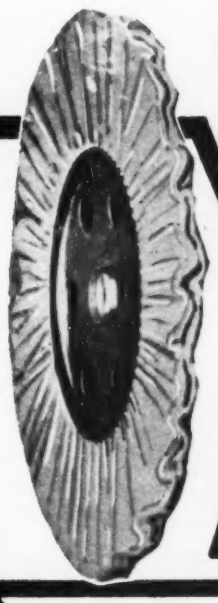
F. Deutz: *Zeitschift Metallkunde.* Vol. 46, No. 4, p. 254.

European practice for the attainment of a clean surface for brass sheet and strip is discussed including the methods for the removal of casting and rolling skin, continuous annealing, cleaning, pickling and washing as well as annealing in a protective atmosphere in continuous furnaces.

Theory of the Formation of an Anodic Coating on Aluminum

I. W. Krotow: *Shurnal Fisitscheskoi Chimii* (Russia). Vol. 28, No. 9, p. 1550.

Aluminum was anodically oxidized



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in a sulfuric acid solution. Only AlOOH and $Al(OH)_3$ were established in the oxide coating. Possibilities for the reaction mechanism are discussed, by which not only electrochemical but colloidal - electrochemical processes should play a role.

Bright Copper Plating Baths

E. Lutter: *Metallwaren Industrie und Galvanotechnik.* Vol. 47, No. 1, p. 2.

After a survey of the development of copper baths and the high speed copper bath, the author considers bright copper plating electrolytes. The characteristics of a modern bright copper bath are a high metal content, a low free cyanide content, addition of hydroxides and thiocyanates, organic brighteners, with emulsifiers and wetting agents. The high metal concentration allows the application of high current densities and the relatively low cyanide content increases the current efficiency, reduces the hydrogen evolution, and gives softer deposits. The addition of hydroxides is necessary to improve the conductivity of the electrolyte and to retard the decomposition of the cyanide. A feature of the bath is that, in spite of the high temperature, the carbonate formation is low. Bright copper baths have now been working for several years at maximum loading on a 2-3 shift schedule without considerable carbonate enrichment being encountered. The thiocyanate acts as a secondary brightening agent. It is very important to clean the ware thoroughly; if any grease passes into the plating bath, the wetting agents and emulsifiers will assume the function of degreasing agents and bath disturbance will result.

Consideration of the wetting agents in a bright copper bath is necessary. Ionic and non-ionic emulsifiers are used; the former have a considerably better emulsifying and peptizing effect, and do not foam. The latter show a higher wetting action and foam strongly. The non-ionic wetters can be water-or oil-soluble, the former being used for this purpose. If the surfactant becomes depleted because of imperfectly cleaned ware being passed into the plating bath, it can be made up by fresh addition, but this process has definite limits, because the oil-containing emulsion formed will commence to spot the ware. The trouble develops slowly, unlike the bright nickel bath where it appears suddenly. It will start first in recessed areas and in the interior of parts, and is easily missed at the beginning.

The free cyanide content of the bath must also be watched carefully. If too little free cyanide is present, bath troubles will follow, such as rough, dark, and dull plate. Continuous control of the free cyanide content is necessary while brighteners and wetting agents need only be added at longer intervals.

The Lancy Process for Plating Waste Waters

W. Peters: *Metallwaren - Industrie und Galvanotechnik.* Vol. 47, No. 1, p. 12.

The Lancy process for dealing with

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cyanide-containing waste waters from plating bath wastes is described in detail, with diagrams of the plant layouts employed for handling and disposing of the waste liquors. Sodium hypochlorite solutions are used as the chlorinating agent to react the cyanide to carbon dioxide and nitrogen; antifoaming agents are added to increase its activity. A relatively high chlorine excess is used, so that it can be estimated that the waste cyanide is completely reacted and rendered non-toxic within 2-4 hours.

The factors required for the planning of a satisfactory-operating cyanide waste disposal layout are:

1. The volume of the detoxifying solution must be adequately calculated;

2. The circulating speed of the solution must guarantee that, even with a sudden-onfall of greater amounts of ware being handled, there is always active solution in the detoxifying tank.

3. The containers must be so constructed that, in the detoxifying tank, the total volume is circulated and, in addition, in the reserve tank an intimate admixture results with the detoxifying medium.

4. All the seepage points for the bath dragouts must be so arranged that these liquors can be passed in a suitable manner to the handling solution. Special measures are neeedd for barrel plating.

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pH Measurement in Plating Baths

Metallwaren-industrie und Galvanotechnik. Vol. 47, No. 1, p. 33.

After discussing the theoretical aspects of hydrogen ion concentration in plating and its importance to the plating process, the author discusses means for measuring the pH and controlling it to the desired figure. In many plating baths, if the hydrogen ion concentration is allowed to rise too high excessive generation of hydrogen occurs, which can lead to pitting troubles, occlusions in the deposit leading to embrittlement and stress, hard deposits, and disturbance of the bath characteristics such as throwing power, smooth deposition, etc. On the other hand, if the pH is allowed to rise too high, trouble can arise through disturbance of the cathode film and formation of hydroxide in this film which becomes co-precipitated in the deposit. Nickel baths are very sensitive to pH in this respect and the best operating value is 5.5-6.0. With high current densities and non-agitated baths, the value will be at the lower limit; bath agitation will push it to the right. Within this pH range the nickel deposit will be compact, adherent and a gray-white color. At a pH of 4.5 the nickel will be brittle, nodular, and flaky.

In practice, to maintain the pH constant, buffering agents are used as an aid. All the organic acids, such as citric acid, are of this nature, as is boric acid. The present-day pH measuring equipment which is available, permits even relatively unskilled personnel to ascertain and control the pH of the plating bath in continuous operation.

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Recent Developments

NEW METHODS, MATERIALS AND EQUIPMENT
FOR THE METAL FINISHING INDUSTRIES

Film Gauge

Boonton Radio Corp., Dept. MF, Boonton, N. J.

The above firm announces a new film gauge, Type 255-A, an electronic instrument for measuring quickly and precisely the plating and film thickness on metals.

The instrument features, for example, interesting applications in measuring the protective coating thickness of anodic films on anodized aluminum, magnesium, and other non-magnetic basis metals — including such insulating films as organic paints, porcelain, enamel, and other non-conductive coatings, according to the manufacturer.

The new instrument also aids in sorting metals in accordance with their electrical conductivity and in matching metals in accordance with their magnetic properties.

The gauge is also said to be useful for making these different types of measurements: for measuring the film thickness of non-magnetic platings such as silver, gold, cadmium, chromium, rhodium, etc., on such non-magnetic basis metals as copper, brass, aluminum, etc.; and for measuring the thickness of conductive, non-magnetic materials such as copper on insulating basis materials such as glass, phenolic sheet material, ceramic, etc.

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Recirculating Unit for Cooling Plating and Anodizing Baths

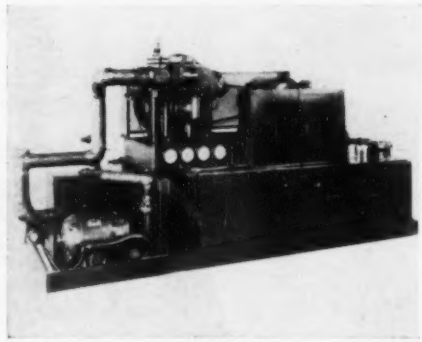
Mayer Refrigerating Engineers, Inc., Dept. MF, Lincoln Park 5, N. J.

Designed and engineer for the plating and anodizing industry, a refrigeration and recirculation unit has been introduced by the above manufacturers of process cooling equipment.

"Chil-er" refrigeration and recirculating units eliminate excessive process heat by either of two procedures. These are:

1. By circulating cold water through lead pipes which are immersed in the acid bath.
2. By supplying cold water to special heat exchangers through which the acid is circulated.

These units also automatically regu-



late process solutions to within 2°F. for plating operations such as the Martin "Hardcoat" process, where close temperature control must be maintained.

Supplied complete and ready for operation, the units need only electrical connections and piping to the process tank coils or to the special heat exchangers. They are available in 22 models to 150 ton capacity.

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Electric Immersion Heaters

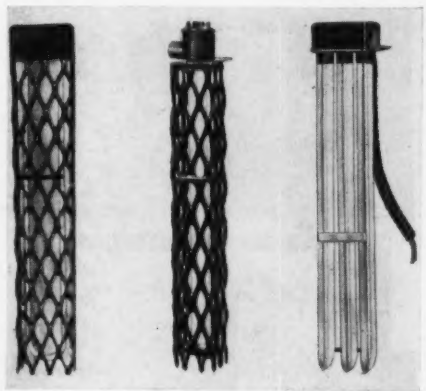
The Glo-Quartz Electric Heater Co., Inc., Dept. MF, Willoughby, Ohio.

The above manufacturer with four basic types of immersion heaters now covers every requirement in the immersion heating field.

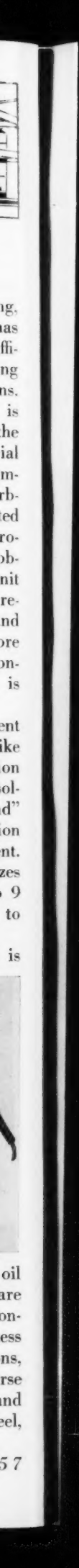
The new "U" type, patent pending, with translucent fused quartz unit, has been designed to solve the very difficult problems that go with the heating of electroplating and pickling solutions. The resistance heating element is mounted within the "U" tube, and the coil is firmly supported with special heat-conducting powder, and is hermetically sealed. A rugged, shock-absorbing, "Diamond" type, plastisol—coated heater guard provides maximum protection for the tube, with minimum obstruction of heat flow. The tube unit is guaranteed for one year, and is replaceable. Shock-proof, thermally and mechanically, it heats instantly. More wattage is obtainable than with conventional straight-tube heaters, it is claimed.

The patented "GN" type translucent fused quartz, straight-tube heater, like the "U" type, is for acid solution applications. It also has the plastisol-coated, shock-absorbing, "Diamond" heater guard, vapor-proof junction box, and replaceable heating element. It is available in a wide range of sizes and wattages, and in lengths up to 9 feet: it can be used in solutions up to 200°F., and in very deep tanks.

The "MB" or Multi-Blade type is



designed for alkaline, water, or oil solution application. The blades are metal-sheathed in copper, for uncontaminated water solutions: in stainless steel, for contaminated water solutions, high pH cyanide plating baths, reverse current alkaline electro-cleaners, and high pH alkaline solutions: in steel,



LEA newsreel

FEBRUARY 1957

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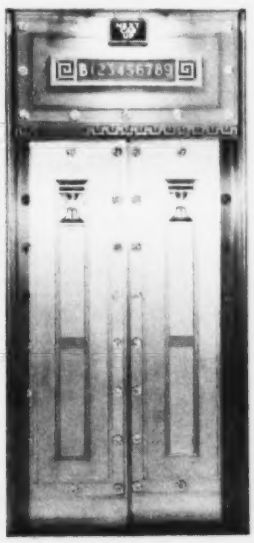
- **Satin Finished Articles have that quality look and retain this appearance for a long time because the finish is not easily marred.**
- **The economy of the Satin effect is well known. The Satin Finish blends with and eliminates the effect of underlying metal imperfections. As a result one or more finishing operations become unnecessary, thereby cutting production costs.**
- **Satin Finished products are finding more and more consumer acceptance everyday.**

Here are some case histories showing how the Lea Method of Satin Finishing has helped cut production costs.

ALUMINUM

Material — Aluminum.
Article — Furniture trim.
Method of Forming — Punching and stamping.
Final Finish — Satin.



Lea Method:
1. 120 set-up wheel.
2. Lea Compound Grade "L" or "C" on 10" diameter loose muslin buff at 1500 r.p.m.
3. Anodize.

Remarks —
Previously this work had been done by the use of Tripoli buffing after the polishing wheel operation, resulting in some polishing marks remaining. This step involved excessive cleaning which was entirely eliminated by the Lea Method.

BRASS

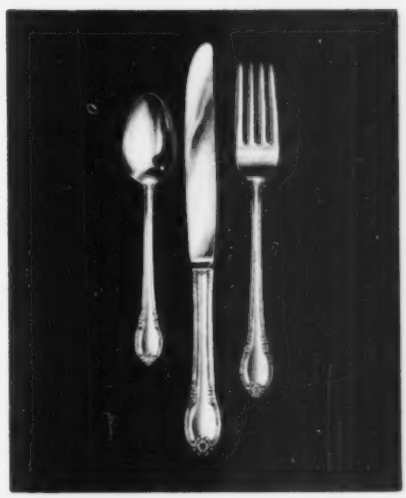
Material — Brass.
Article — Heavy Door Pulls.
Method of Forming — Casting & machining.
Final Finish — Satin finish.
Lea Method:
1. 100 set-up wheel (canvas).
2. 120 set-up wheel (felt).
3. Grade "B" Lea Compound on a 10" diameter muslin buff with radial sewing at 1800 r.p.m.
4. Lacquering.

Remarks —
The Lea Compound step was done in the same direction as the last polishing wheel operation so that there was no crossing of lines. The finish desired was produced with a minimum number of wheel operations and all cleaning eliminated.

STEEL

Material — Steel.
Article — Escutcheon plates, door plates, etc.
Method of Forming — Stamped.
Final Finish — Special satin brass plate.
Lea Method:
1. Brass plate.
2. Lea Compound Grade "R" on a 10" loose buff at 1500 r.p.m.
3. Lacquering.

Remarks —
In substituting for wet scratch brushing, the Lea Method eliminates all cleaning and drying and the nuisance of water stains on the brass surface.



SILVER

Material — Silverplate.
Article — Tableware.
Method of Forming—Forging (nickel silver).
Final Finish — Butler Finish.*
Lea Method:
1. Silver plate.
2. Lea Compound Grade "FG," "MF," or "MH" on 6" brass wire wheel at 800 r.p.m.

Remarks —
Fine grades of Lea Compound on a brass wire wheel produced the bright line finish required without the aid of a prior color buffing operation common to the old wet scratch brushing procedure.

*Butler Finish — A fine delicate satin finish with some brilliance.

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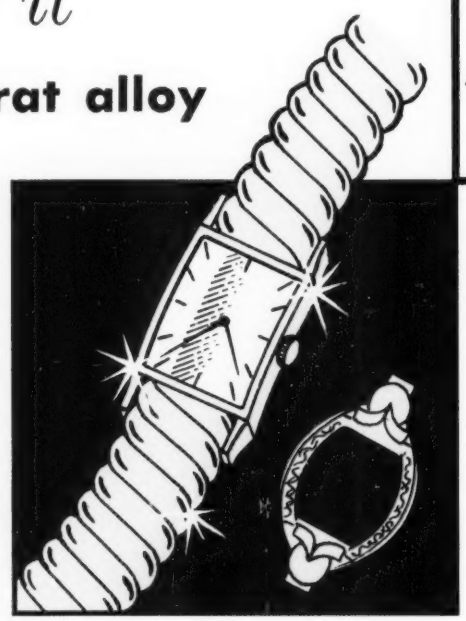
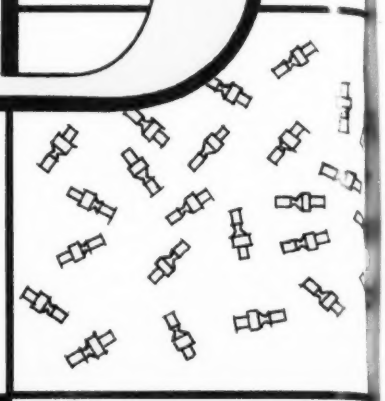
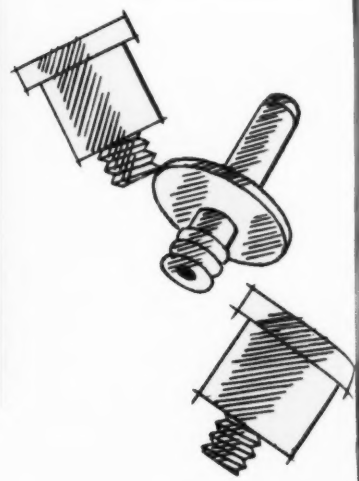
24 karat **low karat alloy**







Since the operations of its first commercially proved decorative gold process in 1949, Lea-Ronal has continually been striving to give the plater gold processes that meet his requirements. As the result of constant research and experience, we can offer platers proved processes with the following outstanding values:

Bright 24 karat or bright low karat alloy (16-20K) directly from the bath.

Economy of operation . . . the Lea-Ronal bath contains only half the amount of gold found in the least concentrated conventional bright baths . . . hence, gold investment is reduced . . . drag-out loss is correspondingly low.

Simple operations and control — both processes operate at room temperature without special current manipulation cycles.

Outstanding wear resistance; a well-known manufacturer conducting a series of controlled wear-tests reports that the resistance of a 0.000050 inch deposit of Lea-Ronal MS was equal to that of a 0.0002 inch deposit from a conventional deposit.

Alloy deposits that are bright with excellent hardness and that can be made to approach rolled gold plate in color.

If your requirements call for 24 karat gold deposits, investigate the Lea-Ronal Bright Gold MS; if alloyed colored deposits, it would be Lea-Ronal Bright Gold MSA.

Why not get full details of either or both? Most existing solutions can be converted. We would appreciate it if when writing, you would outline your operations and detail your problem.

The LEA GROUP
serving the Finishing Field
Lea-Ronal, Inc., Jamaica, N. Y.
Lea-Michigan, Inc., Detroit
The Lea Mfg. Co., Waterbury, Conn.
Lea Mfg. Co., of Canada, Ltd.
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Lea-Ronal Inc.

Main Office and Laboratory:
139-20 109th Avenue, Jamaica 35, N. Y.

Manufacturing Plant:
237 East Aurora Street, Waterbury 20, Conn.

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for low pH alkaline or cyanide plating baths, or oil solutions. There is maximum protection against burn-out, because each blade is individually wired with several parallel resistance elements. These units are portable, and easy to mount to the side of the tank.

The "IG" or Impreviously Graphite type immersion heater is designed for hydrofluoric acid solution application, copper fluoborate plating baths, and in acid solutions containing hydrofluoric and concentrated phosphoric acid solutions. A heavy walled tube encases a resistor element that is firmly embedded in a special compound that prevents stray currents and is conducive to efficient heat transfer. A vaporproof junction box is mounted permanently onto the tube.

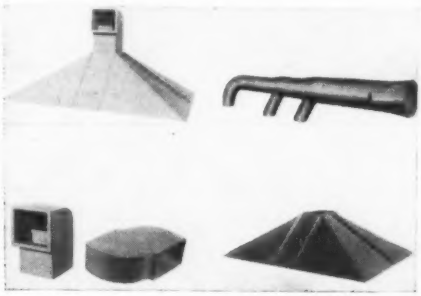
For laboratory use, there are two types—the LHP "pencil" type translucent fused quartz unit for acids: and the LB or metal-sheathed.

Further information may be obtained from the above manufacturer.

61/Circle on Readers' Service Card

Fume Ducts and Hoods

The Ceilcote Co., Inc., Dept. MF, 4844 Ridge Road, Cleveland 9, O.



Fabricated of a thermo-setting plastic material which is combined with glass or other synthetic fibers, the new Duracor ducts and hoods can be produced to virtually any required shape. The combination of chemical resistance, lightweight, strength, easy workability, design, flexibility and attractive appearance make it an ideal material for the construction of plating, pickling and chemical fume ducts.

Physical properties of the materials range from 11,000 to 15,000 pounds per square inch for tensile strength, and flexural strength ranges from 22,000 to 30,000 per square inch depending upon desired material thickness. Fabricated tank hoods can be produced to any desired shape, and fume ducts leading from these tanks can be formed to handle virtually any volume of corrosive gases at any desired pressure. Because of light weight and easy handling, only a minimum of time is required for installation. Overhead ducting can be supported simply and easily because of the low weight factor.

62/Circle on Readers' Service Card

Electronic Thickness Tester

Kocour Company, Dept. MF, 4800 S. St. Louis Ave., Chicago 32, Ill.

The new Model 955 Electronic Thickness Tester determines the thickness of plating and other metallic coatings deposited over various metals and non-metallic base materials with an accuracy of 90-95%. Operation is very simple and virtually automatic. Readings are direct.

A multiple position switch indicates the plating to be tested. The thickness of decorative and heavy chromium, silver, tin, cadmium, zinc, copper, brass, nickel, lead, lead-tin, and tin-zinc alloy can be determined on steel,

with the PARAMOUNT
"Finishing Touch"
"To achieve a fine finish on beautiful sterling silver flatware, you start with a smooth, uniform surface," says Gorham Mfg. Co., leading silver–and goldsmiths. "To eliminate major defects in the metal before final finishing, we've found that the most efficient method is to use Paramount Felt Bobs with a mixture of fine pumice and oil. Paramount felt wheels and bobs are ideal for polishing flatware and holloware. Easily formed and having an affinity for pumice and oil, they produce a better surface than any other buff."
For fine, basic finishes, quality manufacturers depend on Paramount Wheels and Bobs. Join the leaders–specify Paramount. Call your supply house today!
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63/Circle on Readers' Service Card

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Here and abroad, leading chemical and aluminum producers, as well as manufacturers of rectifier equipment, are swinging to International Rectifier Corporation germanium junctions. Why? High efficiency (up to 97%)... smaller unit size... and increased reliability! These revolutionary junctions are in the better power rectifier units of today. Are they in yours?

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1 LIQUID-COOLED GERMANIUM JUNCTION, rated at 670 amperes, 26 to 66 volts. Housed in high-conductivity copper, cast around a steel coil. Water, oil or other accepted coolants may be used. Size: Approximately 3½"x4"x4¼".

2 AIR-COOLED GERMANIUM JUNCTION rated at 333 amperes, 26 to 66 volts . . . one of a new series featuring cast aluminum housing—an exclusive design by International which provides extremely high resistance to corrosive atmospheres. 500 ampere unit available . . . slightly larger size.

3 FAN-COOLED GERMANIUM JUNCTION 150 amperes, 66 volts, half-wave. Thousands of these highly efficient (up to 97%) units, featuring this exclusive thermodynamic design, are serving American industry today.

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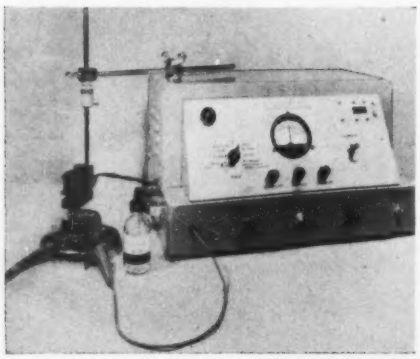


copper, brass, aluminum and other metals, and on non-metallic materials such as ceramics and plastics.

A new calibration feature in conjunction with thickness standards ensures "long term accuracy." Not only can the accuracy of the instrument be checked at any time, but a calibration adjustment will automatically correct high or low readings.

A constant pressure device which automatically maintains a uniform pressure between test cell and specimen is one of the new features. This eliminates previous reliance on operators judgment.

67/Circle on Readers' Service Card

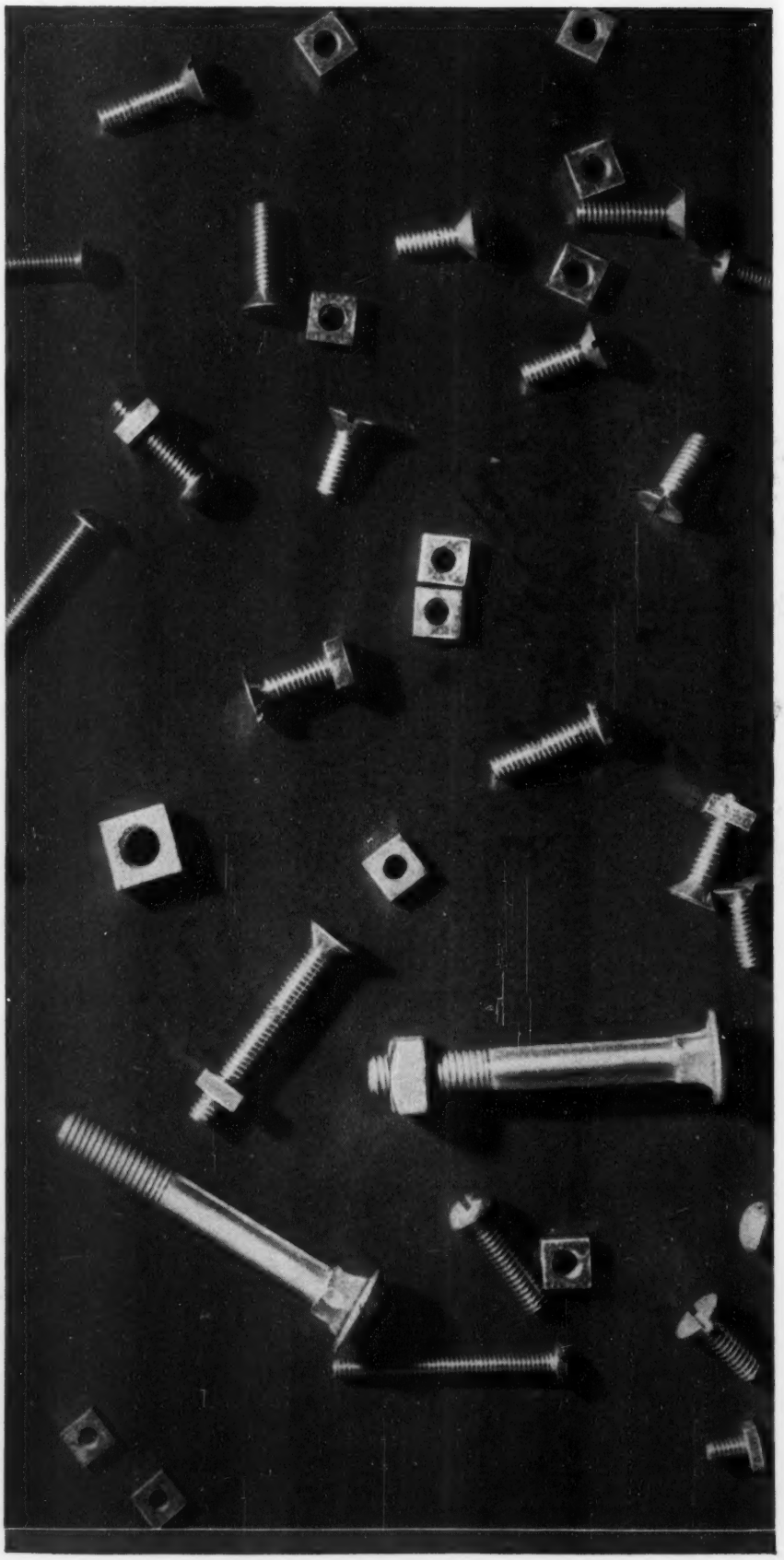
Titanium Descaling Process

Turco Products, Inc., Dept. MF, 6135 S. Central Ave., Los Angeles 1, Cal.

A process that efficiently descales titanium and its alloys without adversely affecting the physical and chemical properties of the metal requires only two immersion steps (one for scale conditioning and one for scale removing) and two rinsing steps, following the heat forming or heat treating operation.

The titanium descaling process eliminates the disadvantages of descaling titanium by sand blasting, vapor blasting or by immersion in molten salt baths. It requires only relatively low temperatures (270-280°F. as compared with 800-900°F.), results in low metal loss (0.0001″ to 0.0003″ per side), and is suitably inhibited to avoid hydrogen pickup and the resultant hydrogen embrittlement (± 4 ppm. or 0.0004% hydrogen per cycle). In addition, the process gives one hundred per cent chemical cleanliness without warping thin gauge material, without causing salt entrapment in faying edges, without creating fire hazards and without adversely altering the physical characteristics or surface smoothness of heat treatable alloys.

68/Circle on Readers' Service Card



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Competitive testing at ASARCO's Central Research Laboratory has proved that Federated Plating Brighteners will do a better job at lower cost.

CADMAX for cyanide cadmium plating, is compatible with all organic brighteners, comes with an adjuster solution to give you brilliant results, even from a new bath. No break-in is required.

ZIMAX in powder or liquid form, is most economical to use. It is applicable to every type of zinc plating operation, and is compatible with most other zinc brighteners.

NIMAX is a highly concentrated nickel brightener for use in barrel nickel plating. Five cents worth is enough for approximately 50 pounds of work. The deposit is ductile and extremely corrosion-resistant.

Send us a sample of your plating bath. Then follow the simple instructions that we give you. You'll get better results, at lower cost!

Federated Metals ASARCO

Division of

AMERICAN SMELTING AND REFINING COMPANY

120 Broadway • New York 5, N.Y.

70/Circle on Readers' Service Card

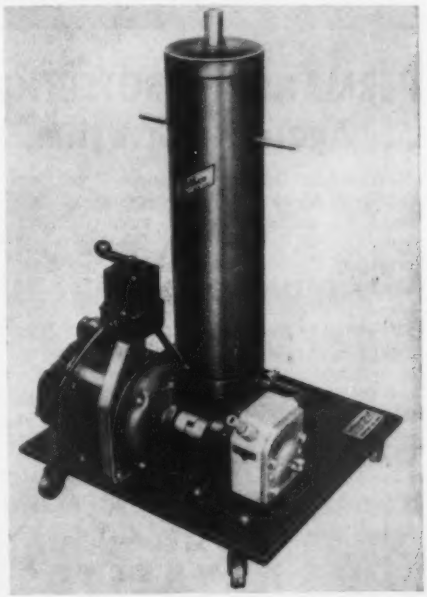
Chromium Plating Filter Pump

Sethco Mfg. Co., Dept. MF, 70-78 Willoughby St., Brooklyn 1, N. Y.

An addition to the above manufacturer's VPHI series of self priming filter pumps for chromium plating solutions is Model VPHI-20 rated at 200-300 gallons per hour filtering capacity. It can also be employed for all common acid and alkaline electroplating and industrial solutions.

All-plastic construction, it is completely corrosion resistant, no metal wetted parts, and has a self priming leak-proof pump.

Particles down to 1 micron in size may be removed from solution, and the chamber can be back washed with reversal switch for longer cartridge life.



The unit consists of the following components:

Filter Chamber:—Rigid polyvinyl chloride with vinyl coated center rod and vinyl and Teflon gaskets. Chamber contains two No. 10 Dynel filter tubes. Steel outer casing is used to give added support for rigid P.V.C. shell.

Pump: — Polyethylene pump body with Hypalon impeller.

Motor:—¼ H.P., 110 volt, 60 cycle, single phase, totally enclosed, ball bearing, capacitor type. Equipped with 3 wire grounding cord, feed-through switch and molded rubber grounding plug and adapter for 2 wire outlet.

Hose:—20 feet of vinyl hose. P.V.C. strainer provided for inlet hose.

Panel:—All equipment is mounted on phenolic linen surfaced panel 16" x 18" x ½" thick, which is equipped with ball bearing rubber tire casters.

71/Circle on Readers' Service Card

Photo courtesy: Hanson-Van Winkle-Munning Co.

PERMANENT PROTECTION . . .
. . . Against Corrosion, Contamination, Abrasion

Manhattan Rubber Linings give you the kind of cost-saving protection you need in metal plating and pickling operations. They are made from multiple calendered sheets of rubber, bonded so securely mechanical pull tests prove they can't be separated! This means you get *lasting* protection against corrosion of your equipment or contamination of solutions used in processing . . . *positive* protection from the dangers of stray currents in plating operations. It's the kind of *permanent* protection that has kept many Manhattan Rubber Lined plating tanks in continuous use for over 30 years!

Any equipment that can be shipped can be lined by Manhattan. Every tank lined by Manhattan is tested under high voltage to detect any possible imperfections before it is shipped back to your plant.

For perfect, bonded protection of your costly equipment . . . *permanent* protection against corrosion, contamination and abrasion . . . consult the R/M rubber lining plant nearest you.

RM 623

RUBBER LINING PLANTS AT PASSAIC, N.J. • NORTH CHARLESTON, S.C.

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Fan Belts • Brake Linings & Blocks • Clutch Facings • Packings • Asbestos Textiles
Engineered Plastic, and Sintered Metal Products • Abrasive & Diamond Wheels • Bowling Balls

72/Circle on Readers' Service Card

Degreasing Solvent

Octagon Process, Inc., Dept. MF, 23 Bank St., Staten Island 1, N. Y.

Klearall 95 Cold Degreasing Solvent is now being supplied, based on a new improved formulation. The new solvent is now being supplied, based on a new improved formulation. The new solvent gives accelerated degreasing action, increased recovery rate and exceptional stability. The toxicity rating has been raised from 350 ppm to 375 ppm for greater personnel safety.

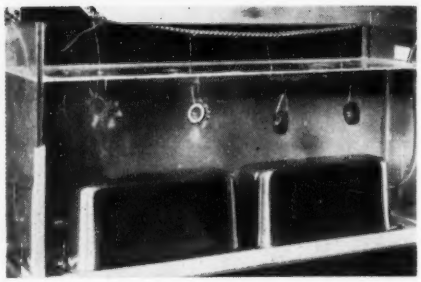
The solvent can be used in conveyorized cold degreasing operations or in single dip tanks. It requires no water or solvent rinse. It leaves no oily residue on finished work. Drying time is fast—almost as fast as trichlorethylene. The product is non-corrosive to all metals and is non-explosive. It can be safely used in mild steel tanks, at room temperature and in any adequately ventilated enclosed area. It is available from stock, in standard 54-gallon and 5-gallon drums and in 1-gallon case lots.

73/Circle on Readers' Service Card

Ultrasonic Cell for Large Tanks

The General Ultrasonics Co., Dept. MF, Hartford, Conn.

An all-welded stainless steel ultrasonic immersion transducer provides 52 square inches of radiating area for tanks and vats of unlimited volume.



It is claimed that this is the largest immersion transducer now available.

A new method of coupling and reinforcing the crystal transducers through solid metal matching elements results in nearly 90% conversion of energy and exceptional ruggedness and long life. The use of seam welding construction, rather than solder, eliminates the former hazards of chemical and cavitation erosion, and it is claimed that the new D-52 Sonicell will work 24 hours a day efficiently and indefinitely in all known solvents.

Double units will operate with a single Model 700 generator. Groups or arrays of the cells are powered with motor-alternator power sources. The cells operate at 20,000 cycles per second. This frequency has proved to be most effective for cleaning, pickling, and plating processes and is well above the audible range.

74/Circle on Readers' Service Card

Finned Tubular and Strip Heaters

General Electric Co., Dept. MF, Schenectady 5, N. Y.

All finned tubular heaters produced by the above manufacturer on a standard basis will now have a diameter of 0.496 inch, according to an announcement by the company's Industrial Heating Department. At the same time, the company announced catalog ratings up to 10,000 watts for each heater type and the addition of the configuration "W" to the standard shapes available. All heaters are available with the recently developed ceramic - to - metal hermetic seal.

The new standard diameter for finned tubular heaters does not affect interchangeability with the previous diameter size of 0.540 inch. All heaters will be rated at 240 volts to conform to new NEMA standards.

All strip heaters formerly manufactured with plain steel sheaths will now be sheathed in aluminized steel at no increase in price. Aluminized steel will extend temperature limitations by 250 degrees, from 750 F. to 1,000F., elim-

inating the need for more expensive sheath materials for applications which require sheath temperatures up to 1,000F. In addition, aluminized steel is highly resistant to corrosion, so that it can be kept in stock for extended periods without rust. For applications requiring sheath temperatures to 1,200F., heaters with chromicized sheath material at slightly higher cost are available.

The extensions of heater sizes and types available should make it possible to use standard catalog units for approximately 90 per cent of all present applications, making possible extensive savings through the avoidance of special models.

75/Circle on Readers' Service Card

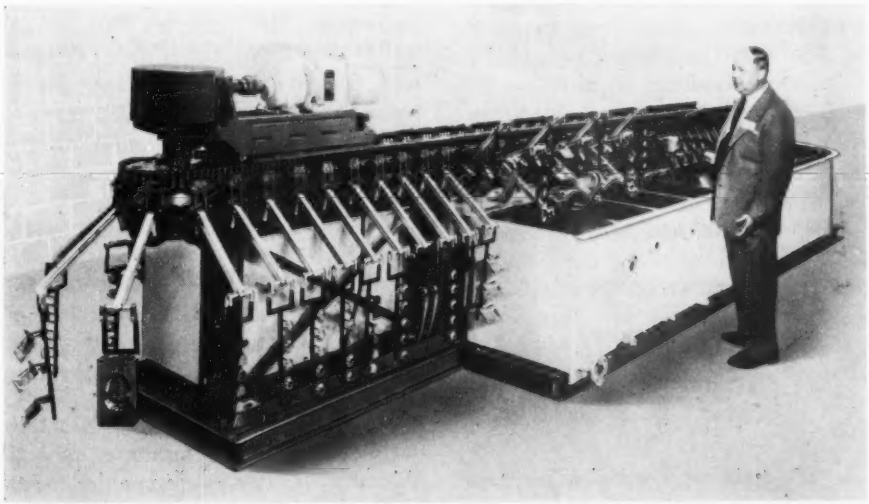
Automatic Processing Machine

Frederic B. Stevens, Inc., Dept. MF, 1800-18th St., Detroit 16, Mich.

"Little Steve," small, compact but with a big capacity, was designed and manufactured in answer to the need for a production plating unit for small and medium sized parts. It also fills the bill for a small automatic plating machine with a big capacity for finishing larger parts that do not require extremely high production. The machine measures only seven feet in width and ten or more feet in length.

Since it is usually shipped as a complete unit from the factory, it can be installed and in operation within a few hours. Due to the machine's low overall height, no overhead construction is necessary. Should a move to another part of the plant be necessary, the whole unit can be moved in a matter of a few hours.

There are three distinct handling methods for processing smaller parts on the machine. 1) The carrier arm acts as a holder for small individual racks. 2) The carrier arm acts as a rack and small parts are attached directly to it. 3) The carrier arm acts as a rack and the arms are racked rapidly and efficiently on and off the carrier arm bracket of the machine.



77/Circle on Readers' Service Card

Stainless Steel Temperature Regulator

Fulton Sylphon Div., Robertshaw-Fulton Controls Co., Dept. MF, Box 400, Knoxville, Tenn.

A new stainless steel temperature regulator is designed to withstand the corrosive effects of certain fumes, gases, acids and chemicals.

In standard models of this control the entire upperworks are of stainless

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business...
RUTLEY
BURNAMITE
Finest Quality
BALL BURNISHING and
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producing superior color, lustre and finish on Zinc Die Castings.
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Rutley compounds are expressly developed to meet the specialized needs of the metal finishing industry. Specialized know-how is the intangible ingredient that makes Rutley compounds outstanding for quality and performance. They meet the highest standards for metal cleaning, burnishing and tumbling. This specialized know-how is just one of the many reasons why Rutley compounds do their work faster and better at less cost.
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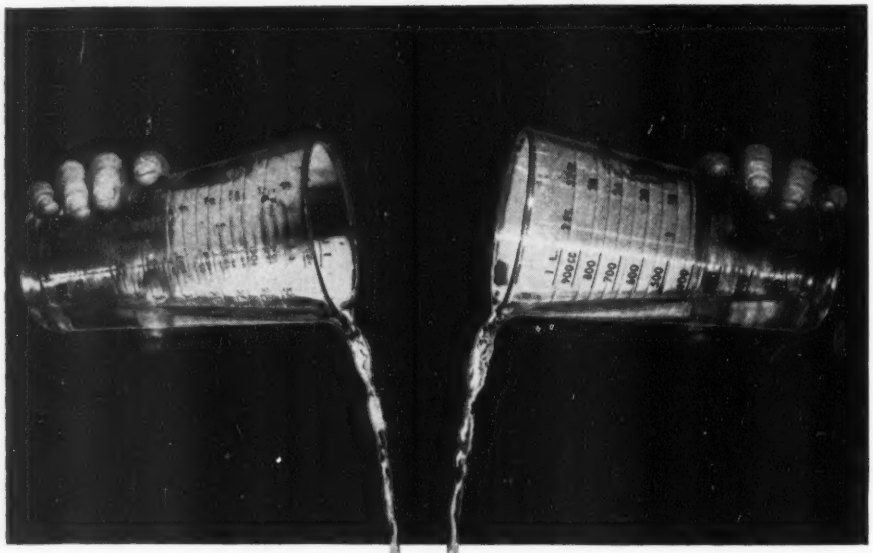

ONLY TWO ADDITION AGENTS CONTROL SEYMOUR BRIGHT NICKEL

It's *easy* to control plating operations when you use Seymour Bright Nickel processes because only two addition agents are needed to insure efficient deposition on ferrous and non-ferrous alloys as well as copper-plated zinc base alloys. Seymour gives you this minimum of control with freedom from hydrogen pitting...

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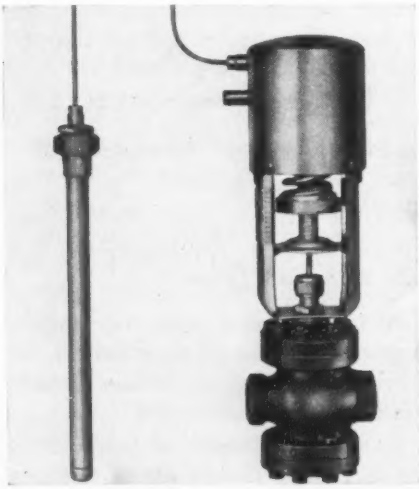
steel. The company says it will supply valves, as well as upperworks in stainless steel, for use in extremely corrosive situations. The No. 11061-R is available in sizes from ¼" to 4", and in temperature ranges between 20°F. and 455°F.



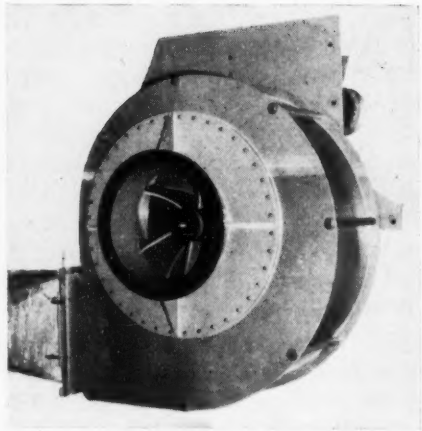
The new regulator requires no external power source, such as compressed air, water or electricity to function efficiently. A large stainless steel bellows used in the thermal unit provides accurate and sensitive control over temperature.

79/Circle on Readers' Service Card

Plastic Blowers

Industrial Plastic Fabricators, Inc., Dept. MF, Endicott St., Norwood, Mass.

A 40" diameter corrosion resistant



PVC centrifugal blower, Model No. CB-40M, with a capacity of 15,000 c.f.m. is especially applicable to installations used to expel corrosive air and fumes. The blower is constructed of unplasticized polyvinyl chloride.

All blower impeller wheels are designed with the back curve, non-overloading characteristics which maintain high efficiency for the conveyance of air and gases. Vibration is essentially eliminated and the impellers are not subject to unbalance. Blowers are equipped with a PVC shaft seal to give long service life to the main drive shaft. Inlet and outlet flanges, gaskets, and drain plug are standard PVC parts.

The blower is available with motor, belts and pulley or less this equipment as desired. Performance charts and complete details on rigid, unplasticized PVC are available upon request from the company.

80/Circle on Readers' Service Card

Radiant Tube Burner

Eclipse Fuel Engineering Co., Dept. MF, Rockford, Ill.

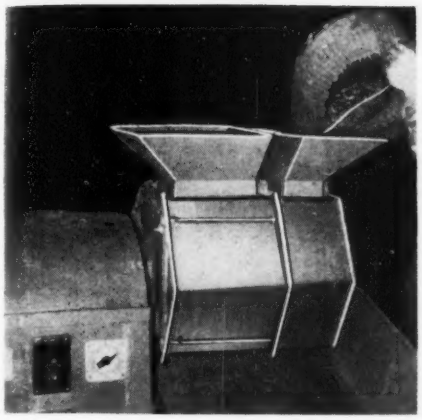
Elasticity in radiant tube design for industrial heating has been increased by the introduction of an adaptable new gas burner assembly. Completely packaged, "RF" burners can be installed directly on either metal or ceramic radiant tubes. They are sealed, nozzle mixing units that keep air and gas separate up to the point of discharge, minimizing danger of flashback or backfire.

81/Circle on Readers' Service Card

Loading Funnel for Tumbling Barrels

Rampe Mfg. Co., Dept. MF, 14916 Woodworth Ave., Cleveland 10, O.

To speed up loading of tumbling barrels as well as to minimize spilling of materials, the above manufacturer



has introduced a line of removable funnels to fit all of their tumbling barrels.

Made of heavy gauge steel these funnels are quickly attached to the opening of the tumbling barrel and are just as quickly detached once the barrel is loaded. Funnels are made for barrels from one gallon to eight cu. ft. capacity.

One side of the spout is vertical to permit the use of two funnels side by side on multiple unit barrel finishers.

82/Circle on Readers' Service Card

Phosphating Compound

Oakite Products, Inc., Dept. MF, 118 Rector St., New York 6, N. Y.

CrysCoat No. 47 is designed to impart an iron phosphate coating of 80 to 120 milligrams in metal spray washing machines. The new compound cleans and phosphates in a simple three-stage operation. It removes light oils, grease, spinning compounds, and shop soils, and converts the surface of steel and iron into a thin, dense coating that resists corrosion and gives lasting paint adhesion. The coating, under standard finishes, has withstood more than 600 hours of salt spray testing, it is claimed.

The material is used at 1½ to 2½ ounces per gallon of water in the first stage of the washing machine. It is followed by a hot water rinse, then by hot chromic acid or CrysCoat FH rinse.

Among the advantages claimed for this new member of the CrysCoat phosphating group are: stability in solution despite minor changes in pH; heavier and faster rate of coating; improved corrosion resistance; low foaming character, safety on equipment; and satisfactory cleaning of aluminum, zinc, and brass, as well as ferrous metals.

83/Circle on Readers' Service Card

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The experience gained in over 70 years of machinery building has provided us with a big bank of "Know How."
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The Rotary Automatic illustrated represents one of our many types and sizes of automatic finishing machines for either continuous rotation or indexing. The head and stand units shown are a part of a large "family" which range in type and size up to 20 HP.
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84/Circle on Readers' Service Card

Water Cooling Tower

Lundholm Mfg. Co., Dept. MF, 1121 Charles St., Rockford, Ill.

An all metal water cooling tower that may be installed inside of the plant is constructed of lightweight steel and aluminum, with overall dimensions on the 2-ton capacity tower of — length 34½", width 27", and height 41". Because of the compactness of the tower, installation inside of the building may be utilized. Where floor space is at a premium, overhead suspension above the machine is recommended.

The tower can save up to 90% on water consumption, providing cooling tower operations to industries located

85/Circle on Readers' Service Card

in arid areas where water scarcity is a problem. Reduction in water consumption is also beneficial to companies where surplus water disposal is costly. Inside installation prevents winter freeze-ups, accentuating year around operation.

The cooling tower is designed specifically for use with the firm's water cooled liquid coolant chillers. The towers are available in capacities ranging from 2 to 25 tons. They are equipped with circulation pumps to correspond with each application. Installation is simple, all plumbing parts are easily accessible and maintenance costs are low.

86/Circle on Readers' Service Card

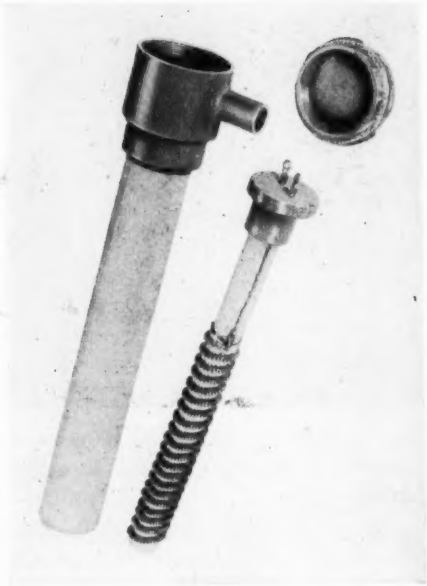
Quartz Immersion Heaters

Pyrosil Inc., Dept. MF, Cuyahoga Falls, O.

A savings of up to sixty per cent on replacement costs of immersion heaters is now possible through a new development. When there is a 'burnout', only the element needs replacement in the new patented Pyrosil fused silica replaceable element immersion heater.

The heater is claimed to be explosion-proof as it breathes constantly through the junction box lead-in conduit, preventing pressure 'build-up' inside of the shell.

There are now four interchangeable



sizes. By using the same quartz shell and acid-resistant boot and cap, only the replaceable heating elements need be changed in order to attain different K. W. ranges.

Other advantages of the new heater are the heavy duty outer shell which is able to withstand greater mechanical shock and the low temperature element on a spiraled silica core which is suspended, allowing the wire to expand when heated without putting strain on the outer shell, as is the case in cemented heaters.

The replaceable elements are guaranteed 1 yr. or 6,000 hrs. whichever occurs first. The complete units should last several thousand hours beyond the guarantee if they are occasionally cleaned to remove any scale accumulation which otherwise causes excessive operating temperatures by preventing proper transfer of heat to the solution.

Standard sizes are available and specials can be manufactured according to specifications.

87/Circle on Readers' Service Card

Barrel Cradle Truck

Morse Mfg. Co., Inc., Dept. MF, 727 West Manlius St., East Syracuse, N. Y.

A new barrel cradle truck with specially designed curved top rails hold a wooden hogshead or barrel firmly in position, preventing dangerous tipping. Two other important safety features are non-skid devices, located directly forward of the front wheels on the rocker, and a safety catch on the nose piece. This prevents the barrel from sliding during loading.

Ruggedly built, the truck has an 18

inch wheel base. It is available with four large 3 inch diameter wheels placed on a straight axle. Height to the bung of the barrel is 22 inches.

88/Circle on Readers' Service Card

Corrosion Resistant Plastic Lining

Kaykor Industries, Inc., Dept. MF, Yardville, N. J.

The unplasticized polyvinyl chloride lining "Fligid," first introduced two years ago for the protection of tanks, vessels, and other process equipment against corrosion, is now available in two standard thicknesses. The new material is only .055" thick. The original is still available in a thickness of .085".

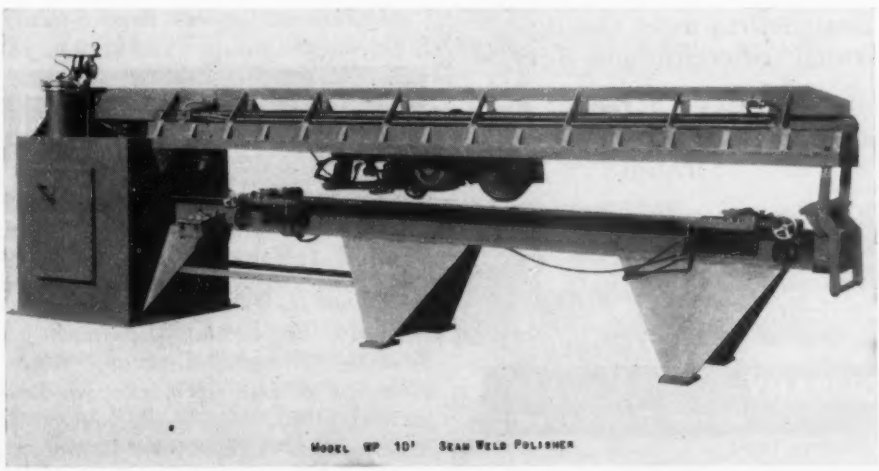
89/Circle on Readers' Service Card

Seam Weld Polisher

Hi-Lite Polishing Machine Co., Inc., Dept. MF, Rt. 2, North 44th St., Sheboygan, Wis.

The model WP 10' seam weld polisher utilizes a 1" x 132" abrasive belt for rough grinding and polishing seam or butt welds on stainless or carbon steel sheets. Capacity of the machine is 10 ft. length on flat sheets, and 10 ft. length and a minimum of 30" on the inside weld of an open end cylindrical tank.

For operation, the welded section is slid on the bed, lined up and clamped with air clamps to the bed plate, and final line-up with the track of the belt made with the hand wheels. Limit blocks are placed on the carriage chain drive, according to the length of weld to be polished. They are said to directly reverse the carriage on reaching the end of the weld. Control buttons directly reverse the carriage in travel, working any particular part of the weld which may require special attention. Pressure is applied to the belt contact wheel by an air cylinder, which is adjustable for light or heavy pressure.



MODEL WP 10' SEAM WELD POLISHER

An oil spray system is incorporated in the unit for maximum abrasive belt life and rapid stock removal.

91/Circle on Readers' Service Card

Expanding-Type Grinding Wheel

Nu-Matic Grinders, Inc., Dept. MF, 8224 Carnegie Ave., Cleveland 3, O.

A series of separate, replaceable rubber segments grip the coated abrasive and form the grinding surface of the "Flexcore," a new grinding wheel. The interchangeable segment feature provides two distinct operating advantages. First, as segments become worn

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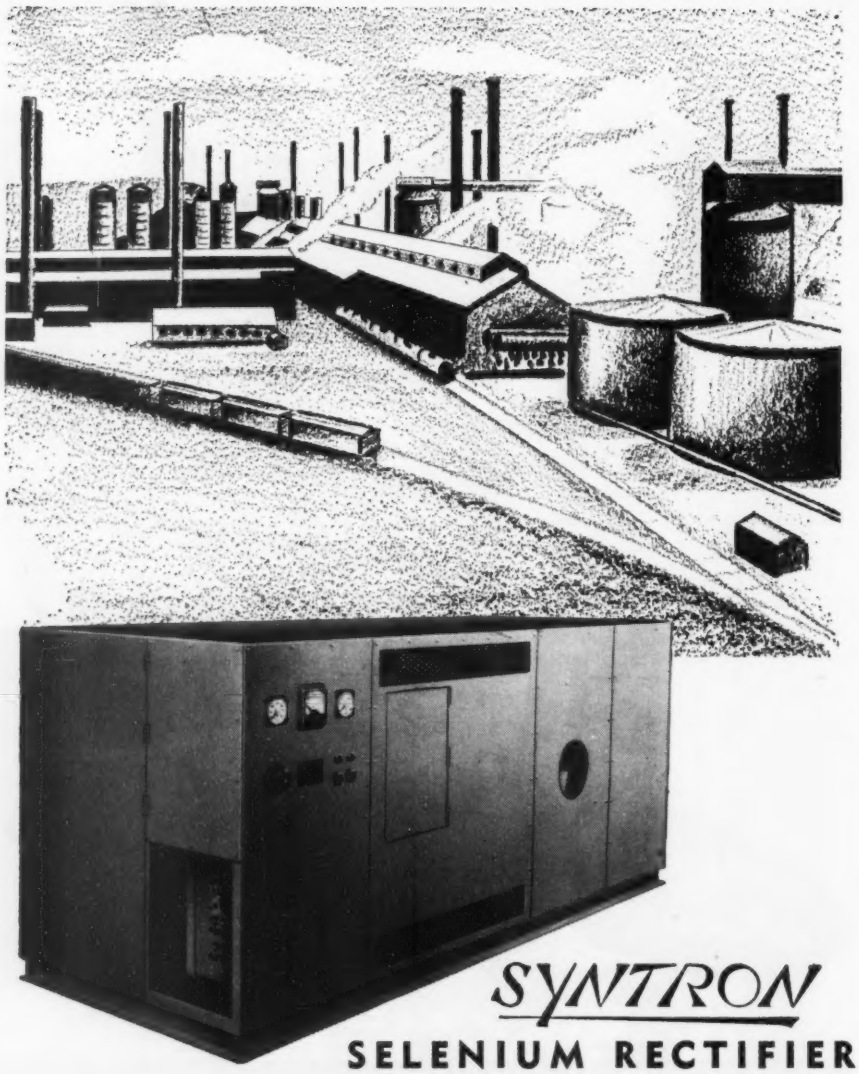

POWER CONVERSION UNITS

Provide completely automatic, low cost a-c to d-c power conversion in one single package — save valuable floor space.

SYNTRON Power Conversion Units contain heavy duty Selenium Rectifiers and automatic voltage regulation. Operation is instantaneous—require no warm-up period. They are able to withstand high overloads for short, infrequent periods without damage. Designed to meet the rigid industrial power requirements—rated for continuous duty.

SYNTRON Power Conversion Units have a record of proven dependability, low operating costs, high efficiency and long life. They are compact and easy to install.

SYNTRON Power Conversion Units can solve your d-c power problems economically and efficiently.

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or damaged, they can be replaced singly or in groups at a very low cost. The core never needs to be replaced. Formerly, expanding type wheels had to be scrapped when a single segment was damaged. Second, segments are available in a variety of hardnesses and so can be used in any combination to attain different cutting actions. For example, a fast cutting action is achieved by using hard segments and soft segments in alternate slots.

The wheel is designed so that complete peripherial contact is made with the coated abrasive band. This is claimed to provide greater holding power on the abrasive band so that the wheel can be operated at much slower speeds than is possible with conventional expanding wheels. Each segment is anchored in the metal core by a key slot and cannot fly off the wheel even if the abrasive band ruptures.

To replace a segment, one simply slides the old segment out of its keyed slot and inserts a new segment. Replacement segments are sold by the 100. A complete set of new segments for an average size wheel costs only $3.50. At no time does one lose the original investment in the core. Design and method of manufacture assures positive quality control from wheel to wheel. Slots are uniform in size and number. Segments are identical. The core is balanced at the factory and stays balanced in use.

Wheel diameters of 3″, 4,″ 5,″ and 6″ are included in this new line. Widths are made to any specification. Standard segments are made to full width of the wheel, but fractional size segments can be provided to obtain a "fingering" action for contouring use. This new line of wheels uses the same length abrasive bands as the firm's "Aircore" inflated grinding wheels of the same diameter.

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BUSINESS ITEMS

Mutual Appoints Weed

William H. Weed has been appointed manager, Engineering Department of *Mutual Chemical Division, Allied Chemical & Dye Corp.* effective January 1, 1957. Mr. Weed, previously chief process engineer, will be respon-

sible for all activities of the Engineering Department which is located at the Baltimore works. A graduate of the Massachusetts Institute of Technology, Mr. Weed joined the firm in 1940.

Allied Research Elects Cairns to Board

At a recent stockholders meeting, *J. A. Cairns* was elected to the board of directors of *Allied Research Products, Inc.*, Baltimore manufacturer of the Iridite line of chromate conversion coatings and ARP plating chemicals. Mr. Cairns has been associated with the organization since 1948 and, in September of 1955, was named sales manager of the marketing subsidiary, Allied Research Sales Corp., which position he still holds.

Bart-Messing and Pennsylvania Transformer to Work Jointly on Rectifier Installations

The Bart-Messing Corp., Newark, N. J. and the *Pennsylvania Transformer Co.*, Canonsburg, Pa. have formulated an agreement to work jointly on the design and installation of Sel-Rex rectifiers for large-scale electrochemical and electrometallurgical applications, according to an announcement released by both companies.

The decision for the cooperative venture was predicated on customer preference for one centralized source of supply with responsibility for all accessory components, such as transformers and controls, required by installations of major scope and magnitude. Each company will be responsible for, and guarantee its own components and equipment supplied for all installations, with Bart-Messing acting as prime contractor.

The arrangements will make it possible for Bart-Messing to offer the complete equipment for major power rectifier installations with the engineering coordinated to give best operating characteristics for each installation.

The Pennsylvania Transformer Co. manufactures a complete line of distribution, power, load tap changing and furnace transformers.

Wagner Bros. to Supply Plating Chemicals

Wagner Brothers, Inc., Detroit manufacturers of plating automation, equipment and supplies has entered the plating chemical processing field.

CEILCOTE
E-900

THE
ONE-COAT
HEAVY DUTY
PROTECTIVE
COATING

ONE COAT = 10 MILS

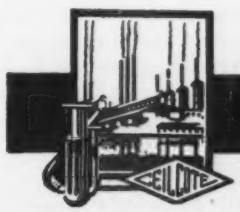
Providing outstanding resistance to a wide variety of chemicals, acids, alkalies and solvents, SERIES E-900 COATINGS offer the same protection afforded by up to ten coats of conventional paints. In addition, SERIES E-900 COATINGS assure long lasting protection to severe weathering.

These new coatings can be applied by brush or roller coat after the addition of a hardening agent. Regularly available in clear . . . white . . . gray . . . or sea-foam green. At normal temperatures, SERIES E-900 COATINGS are dry to touch in about six hours.

RECOMMENDED APPLICATIONS INCLUDE: structural steel . . . tank exteriors . . . lining for industrial water tanks . . . tank truck exteriors . . . stacks . . . exhaust fans . . . concrete piers for plating foundations . . . floors under storage tanks . . . building walls . . . pit walls.

SERIES E-900 COATINGS are high solids modified epoxy formulations which result in superior toughness, resistance to abrasion and superb adhesion to practically any type of clean surface. Because of high solid content, 95% of the applied thickness is converted to a protective film.

Write today for
TECHNICAL BULLETIN E-900



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***First* with Antique Gold Solution**

An inexpensive, quality electroplate with excellent color consistency and remarkable ease of operation.

***First Again* with HARD GOLD SOLUTION**

FOR PRINTED CIRCUITS AND ELECTRONIC PARTS

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★ POTASSIUM GOLD CYANIDE SALTS

★ LUSTROUS WHITE RHODIUM SOLUTION

Now available: variable-type Tank Rheostats, specially designed for precious metal plating.

FREE Consultive Service!

As an added service, Davis-K process engineers are available for consultation concerning special plating problems and installations.

ALL DAVIS-K GOLD PLATING SOLUTIONS ARE:

- made in all colors
- color constant
- tarnish-resistant
- brilliant in finish
- bottled by Troy weight
- made from assayed US Treasury Gold only
- Ready for immediate use

We are fully equipped to reclaim old gold and rhodium solutions. No charge for small sample plating. Write Dept. MFG-57 for details!

"Where Glittering Elegance Reflects Lasting Quality."

100% PURE GOLD DKP SOLUTIONS

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The company's new Lyndon Ave. chemical processing plant is separated from the two other plants to prevent contamination. Since production began in June, a satisfactory inventory has been built so that reliable service can be provided to electroplaters in all parts of the country. All chemical operations are under the direction of *Bruno Leonelli*, vice-president — research.

The following processes are being compounded: Iso-Brite copper, white brass, cadmium, and zinc, Iso-Lok chromate finishes, Wabrite nickel and Krome-on. Also introduced recently is their line of Benchmark metal cleaners.

The company has extensive laboratory facilities and a technical staff for assisting customers with their electroplating problems.

Stanley Chemical Appoints Tesch

Walter W. Tesch has been appointed a sales representative for *The Stanley Chemical Co.*, a subsidiary of The Stanley Works, located in East Berlin, Conn.

Walter W. Tesch

Mr. Tesch will represent the company in the southern New Jersey, southeastern Pennsylvania and Greater Philadelphia areas. He joined the company as a sales trainee in June. He was formerly employed by The U. S. Rubber Co. as a physical test supervisor in its control laboratory.

A native of New Jersey, he attended Moorestown High School and graduated from Nebraska Wesleyan with a degree in chemistry.

Lawson Named Director of Marketing for Pennsalt's Industrial Division

The appointment of *George R. Lawson* as director of marketing of *Pennsalt Chemicals' Industrial Division* was announced recently. In this newly created position, Mr. Lawson will direct the combined sales organizations of the former Sharples and Industrial Chemicals Divisions which were recently consolidated in the formation of the company's new Industrial Division.

Mr. Lawson joined the organization in 1946 and served successively in the former Sharples Division as manager of its New York office, general manager of sales and vice-president in charge of sales. He is an alumnus of Yale University where he majored in chemistry.

Behr-Manning Promotes Durnan to Regional Post

Behr-Manning Co. of Troy, N. Y., a division of the *Norton Co.*, has ad-

John J. Durnan

vanced *John J. Durnan* to the post of eastern regional product engineer to succeed *Elmo Oathout*, who retired recently.

Durnan is a veteran of 14 years with the manufacturer of coated abrasives and pressure-sensitive tapes. He served for three years as foreman of the grinding department in the company's mechanical division, and has since been a product engineer based at Troy. He is a member of Mohawk Chapter, American Society of Tool Engineers.

Equipment Division of National Research Becomes Independent Subsidiary

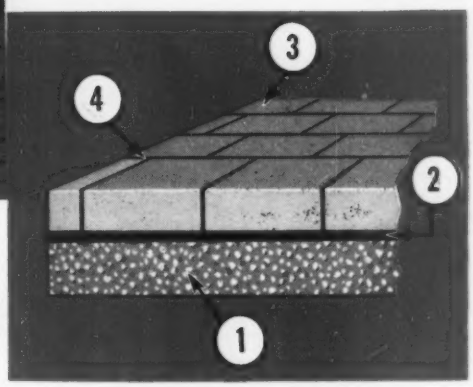
NRC Equipment Corp. will be the new name of the *Equipment Division* of *National Research Corp.* The name, which has been used for the past two years to designate the company's equipment sales organization, reflects more accurately the nature of the operation.

A 20% increase in manufacturing area nearing completion at NRC's plant in Newton Highlands, Mass., will bring the plant to nearly 55,000 square feet.

Stauffer Integrates two Subsidiaries

To simplify and strengthen its organizational structure, *Stauffer Chemical Co.* has integrated two former subsidiaries, *Nyotex Chemicals, Inc.* and *New York-Ohio Chemical Corp.*, into the parent corporation. The former will be operated as Nyotex Chemicals Division and the latter has now been made a part of the company's Industrial Chemicals Division.

Here's why this
PLATING ROOM FLOOR
will last for
FIFTY YEARS
or more!



. . . and will cost practically nothing for maintenance

1. It is built on a rigid, solid sub-base — 4" to 6" thick.
2. The sub-base is protected by a thick corrosion-resistant "Resilon" membrane.
3. Over the membrane, a course of dense, tough, spall-resistant "USSCO" acid brick.
4. Bonded by wafer-thin, non-porous joints with "Durisite" acid-and-alkali resistant cement.

Yes, here's a corrosion-resistant floor that will outlast the building itself. Expensive? Savings in maintenance, alone, will make it over the years the lowest cost floor you can install.

Write for this free booklet!

Detailed construction drawings showing approved methods of building floors, trenches, gutters, tank and motor supports, etc., with full technical data, photographs and case histories. Ask for Bulletin AB-17.

PROCESS EQUIPMENT DIVISION

U. S. STONEWARE

AKRON 9, OHIO

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William F. Pierce Advanced by Barnstead

William F. Pierce, formerly export manager of the *Barnstead Still & Demineralizer Co.* has been named manager of the new Cleveland office.

Mr. Pierce's headquarters will be at 1305 Arlington Road, Cleveland 7, Ohio. The new phone number is ACademy 6-2266.

4 Wyandotte District Managers Honored at Annual Conference

The managers of the four leading *Wyandotte Chemicals, Ford Division*, districts were honored at the recent 1957 sales conference at St. Clair Inn, St. Clair, Mich. Shown left to right are: *Fred Tholen*, sales manager; *C. J. Martin*, Buffalo; *C. B. Dover*, Minneapolis; *Tom Jones*, Atlanta (first place); *F. A. Troxell*, Cleveland; and *Ford Ballantyne, Jr.*, vice-president and general manager of the Ford Di-

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vision. Mr. Ballantyne closed the conference by discussing the 1957 expansion plans of the organization.

Smith Named Sales Manager of Abbott Ball Co.

Roland Smith, formerly assistant to the aircraft sales division manager of The Fafnir Bearing Co., has been named sales manager of *The Abbott Ball Co.*, Hartford, Conn., producers of bearing balls and barrel finishing equipment. Prior to joining Fafnir, Smith was sales manager of The Heim Co. Previous to that, he was with The Remington Arms Co., Inc.

Smith succeeds *C. B. Schaeffer* who has resigned to form his own sales organization. He will represent Abbott in the New England district.

H-VW-M Names Turek Milwaukee Sales Rep.

Hanson - Van Winkle - Munning Co. has announced the appointment of *Gerald F. Turek* as a sales representative in the company's Milwaukee territory. This includes the states of Minnesota, Wisconsin, North Dakota and South Dakota.

In this capacity Mr. Turek will represent the company in the sale of its complete line of metal finishing supplies, processes and equipment. He will work under the general supervision of

Gerald F. Turek

R. H. Granquest, district manager of the Chicago office.

Prior to his present appointment Mr. Turek was in the export sales department, where he became experienced in the company's products and processes. Before that he was a buyer with the Western Electric Co. in New York. He was graduated from Notre Dame in 1950 with an AB in economics.

He is a veteran of World War II, during which he served with the United States Marine Corps.

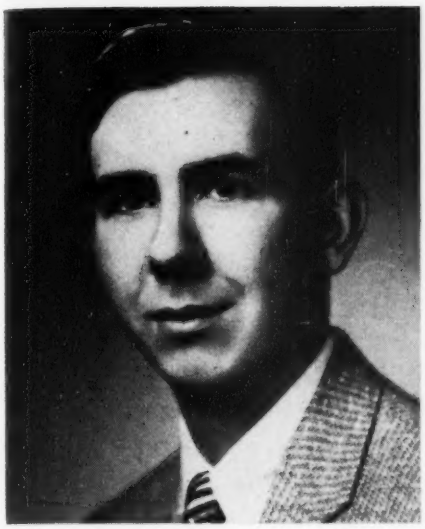
F. H. Ross Company to Represent Pennsalt

The *F. H. Ross Co.* of Charlotte, N. C. has been appointed distributor for *Pennsalt Chemicals'* metal processing products in the seven southeastern states of North and South Carolina, Tennessee, Georgia, Mississippi, Alabama and Florida. Their new Metal Finishing Department, under the direction of *James H. Ross*, represents nationally known companies in plating equipment and supplies, degreasing equipment and solvents, alkali and emulsion cleaners and testing equipment.

Cooper M. Schley is Pennsalt's direct Metal Processing representative in the area. His headquarters are in Birmingham, Ala.

Kurth Joins MacDermid, Inc.

MacDermid Inc., Waterbury, Conn., recently appointed *Arnold Kurth* sales trainee. Mr. Kurth will receive training in the company's customer service laboratory, where metal finishing chemicals and compounds are tested under



Arnold Kurth

actual production conditions. Following a tour of duty in the laboratory, the new sales trainee will be assigned a territory for additional sales training in the field.

Mr. Kurth is a graduate of Rutgers University with a B.S. degree in Business Administration. He served for two years in the U. S. Navy as repair officer aboard the U.S.S. Albany. Before joining MacDermid, Mr. Kurth was employed by the Willette Corp., New Brunswick, N. J.

Stiegman Named Director of Product Development at Hooker

Dr. Clarence A. Stiegman has been named director of product development of *Hooker Electrochemical Co.*, Niagara Falls, N. Y. In this capacity he will direct product development of both the chemical and plastics elements of the firm's business. He was vice-president and technical director of Oldbury Electro-Chemical Co. prior to its consolidation into Hooker on November 29. He will move his office to the administration building shortly.

Dr. Stiegman, whose home town is Paxton, Ill., is a graduate of the University of Illinois, where he received the B.S. degree in 1932, an M.S. in 1934, and a Ph.D. in chemistry in 1937. From 1933 to 1937 he held a teaching fellowship at the university.

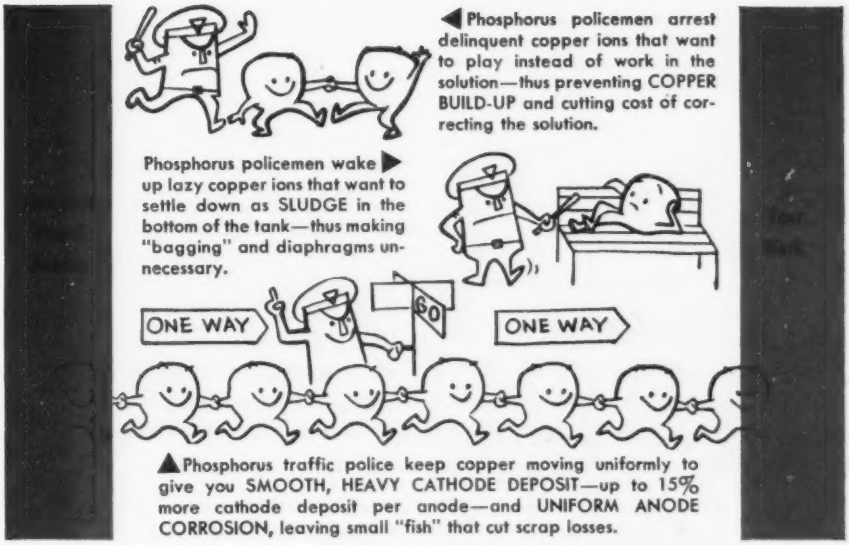
He came to Oldbury in 1937 as technical assistant to the production manager, and has served as manager of new product development, assistant secretary, secretary, and manager of technical sales service. In 1950 he was elected to the board of directors and was also appointed director of technical service. Since 1953 and until the consolidation, he was vice-president and technical director.

Dr. Stiegman is a member of Sigma Xi, American Chemical Society, American Assn. for the Advancement of Science, American Institute of Chemical Engineers, American Institute of Chemists, Electrochemical Society, Chemical Market Research Assn., and Armed Forces Chemical Assn.

Dr. U. T. Greene Promoted by Diamond Alkali

Promotion of *Dr. U. T. Greene* to the newly-created post of assistant director of commercial development has been announced by *Diamond Alkali Co.*, Cleveland, Ohio. Dr. Greene takes over his new responsibilities following six months' leave of absence for service as director of the Chemical and Rubber Division, Business and Defense Services Administration, U. S. Department of Commerce, Washington, D. C.

A native Clevelander, Dr. Greene returns to the organization which he joined in 1942, when he was appointed chief chemist of Diamond Magnesium Co., organized by Diamond Alkali to operate a Government-built magnesium plant located adjacent to Diamond's Painesville Works. Prior to his association with this chemical company, Dr. Greene was a metallurgist for two and


◀ Phosphorus policemen arrest delinquent copper ions that want to play instead of work in the solution—thus preventing COPPER BUILD-UP and cutting cost of correcting the solution.
Phosphorus policemen wake ▶ up lazy copper ions that want to settle down as SLUDGE in the bottom of the tank—thus making "bagging" and diaphragms unnecessary.
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ONE WAY
▲ Phosphorus traffic police keep copper moving uniformly to give you SMOOTH, HEAVY CATHODE DEPOSIT—up to 15% more cathode deposit per anode—and UNIFORM ANODE CORROSION, leaving small "fish" that cut scrap losses.

Here's why Anaconda "Plus-4" (Phosphorized Copper) Anodes cut electroplating cost and give you better work

The playful characters above give a perhaps over-simplified explanation of a laboratory development now saving acid-copper electroplaters, electrotypers, and electroformers a lot of time and money.

Metallurgists in The American Brass Company found that if copper used as anodes contains a small but precisely controlled percentage of phosphorus, all the copper moves uniformly through the acid-copper solution to the object being plated. The phosphorus seems to act like a policeman.

Anaconda "Plus-4" Phosphorized Copper Anodes are the result. They have been proving their superiority in acid electroplating tanks all over the country. Send in the coupon today.

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"PLUS-4"
(Phosphorized Copper)
ANODES
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Please give me details on how I can get a test supply of "Plus-4" Anodes sufficient to fill one tank.

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- No acid pickle or bright dip.
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a half years with Great Lakes Steel Corp., Detroit, and also served four years in the same capacity with The Standard Tube Co., also of Detroit. He also was assistant metallurgist for General Electric Co. at Pittsfield, Mass., for two years.

Dr. Greene earned an A.B. degree in chemistry at Hiram College, Hiram, O., in 1929; received his M.A. at Williams College, Williamstown, Mass., in 1931; and was awarded his doctorate at Rensselaer Polytechnic Institute, Troy, N. Y., in 1933. He is a member of Sigma Xi, honorary scientific fraternity.

Button Named Diversey Sales Vice-President

Bland B. Button has been appointed vice-president of sales for *The Diversey Corp.*, Chicago, effective January 1. In his new position, he will direct a nation-wide, 250-man sales force selling specialized chemicals.

Prior to his new appointment, Button was the firm's general sales manager, responsible for the sales and office operations of eight regional sales divisions. He has been with the company for 17 years. During this time he headed the company's Metal Industries Department and is credited with much of that department's product and market development. He successfully guided that department's conversion after the war years to the production and sale of metal processing chemicals for industrial use.

Mr. Button moves into the position made vacant by the semi-retirement of *W. E. Noyes*. Noyes continues as manager of South American operations, and will serve as a special consultant.

Bland B. Button

Permutit Promotes D. Miller

Durando Miller has been appointed technical manager of *The Permutit Co.*, New York, engineers and manufacturers of equipment for water conditioning, ion exchange and industrial waste treatment.

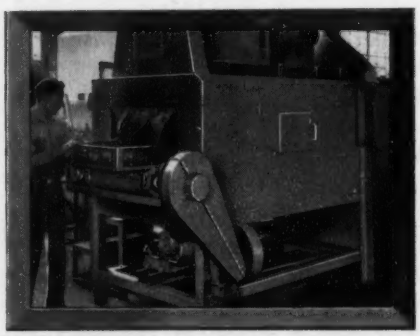
Mr. Miller will be responsible for decisions concerning industrial treatment processes to be used, performance guarantees, the use of pilot plants for specific field problems and other technical matters.

Mr. Miller has been with the company since 1938 and has served as

Is METAL WASHING in YOUR PRODUCTION PICTURE?

If *you* have a problem of cleaning metal products of various sizes and shapes you may find the solution in an inexpensive A-F Engineered Cleaning Machine . . . one that fits right into *your* production picture.

If one of our standard units will not do the job, A-F Engineers are specialists in custom-built cleaning and processing equipment that insures faster production and higher product quality at lowest cost.



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Plant-Wide Conveying Systems
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THE ALVEY-FERGUSON CO., 500 Disney St., CINCINNATI 9, OHIO and Azusa, California

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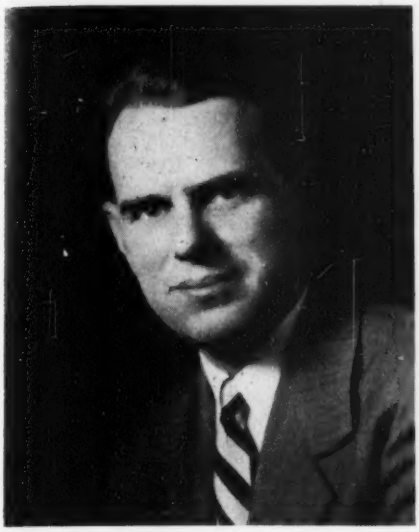

Durando Miller

assistant technical manager since 1953. He is the author of many papers on water conditioning, and for 3 years he was also an instructor in industrial water treatment to classes in Sanitary Engineering at New York University.

The Carborundum Company Announces Appointments

The following appointments have been announced by *The Carborundum Co.*

Wm. H. Wendel, formerly vice-president of the company and general manager of the *Coated Abrasives Division*, was elected group vice-president to coordinate activities of the *Coated Abrasives Division*, Wheatfield, N. Y.; *Curtis Machine Division*, Jamestown, N. Y.; *Globar Division*, Niagara Falls, N. Y.; and *Stupakoff Division* in Latrobe, Pa.

John F. Claydon, formerly sales manager of the Coated Abrasives Division, was appointed general manager of the division; *Herbert P. Dales*, formerly assistant sales manager, was promoted to sales manager; *J. G. Khoury*, formerly field sales manager for coated abrasives in Detroit, was promoted to assistant sales manager; *A. R. Perry* was promoted from salesman to coated abrasives field sales manager of the Detroit district, and *K. H. Wisby*, bonded abrasives salesman, Tulsa, Okla., was promoted to field sales manager of the Southwestern district.

Merchandising Branch Appointments were: *H. C. Smith, Jr.*, district manager, Southwestern District, St. Louis, Mo., who was promoted to manager, Merchandising Branch of the Coated Abrasives Division; *Clifford N. Floyd* and *Harold J. Good* who were promoted to field sales managers in the Pacific district, and *E. M. Matter* who was promoted to field sales manager for merchandising in the Detroit district.

Metal-Kote Corp. Formed

Dr. Harold Narcus, president of *Electrochemical Industries, Inc.*, announces the formation of *Metal-Kote Corp.*, a subsidiary which will specialize in handling metal evaporation on plastics and metal products. A four-story building has been acquired to house the new company. Both firms are located at 35 Armory St., Worcester, Mass.

SPEEDIE TRIPOLI COMPOSITIONS

Both Bar & Liquid Form

For Better Cut and Color on BRASS . . . ALUMINUM DIE CASTINGS, etc.

You can't beat *SPEEDIE* Tripoli Compositions for uniformity or economy . . . T-607 is unsurpassed on brass . . . T-2338 does a beautiful job on aluminum . . . T-167 answers all requirements for die cast. And, if you want a *water-soluble* bar, try T-1639 on all non-ferrous metals. All made for either hand or automatic work. Excellent buffability . . . easy to clean.

If *your* plant uses *liquid* or *paste*, it will pay you to investigate *SPEEDIE* "Spray-It" Tripoli Compositions. Won't clog or settle out. Builds a beautiful head . . . a honey to clean!

Write for full details — today.

The BUCKEYE PRODUCTS Co.
7033 Vine St., Cincinnati 16, Ohio

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SLASH YOUR WATER BILLS...
SOLU BRIDGE Automatic RINSE TANK CONTROLLER

Yes, water savings frequently greater than 50%! An Eastern gold-plating plant, for instance, has reduced its water bill by a rate exceeding $10,000 per year. And because of serious water shortages in many areas, as well as Federal Law No. 845 (making stream pollution a Federal responsibility), there is sharply increased interest in the batch treatment of collected rinse waters.

Installation comprises (a) Conductivity Cell placed in rinse tank; (b) Solu Bridge Controller automatically actuating (c) Solenoid Valve, for any preset degree of rinse.

GET YOUR COPY...

Descriptive bulletin gives working details and economics. Ask your supplier to show you this remarkably inexpensive equipment. Or write us. A postcard will do.

Industrial Instruments

89 Commerce Rd., Cedar Grove, Essex County, N. J.

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NEW

Luster-on®

52 POWDER

PROTECTS and BRIGHTENS ZINC at LOWEST COST YET

LUSTER-ON 52 POWDER *is a low, low priced single dip, no-leach conversion coating for zinc plated surfaces.*

LUSTER-ON 52 POWDER was recently developed by The Chemical Corporation for automatic equipment where facilities are not available for added leaching and rinsing.

LUSTER-ON 52 POWDER gives a bright bluish hue; provides lasting corrosion protection against staining, tarnishing and white powder products.

LUSTER-ON 52 POWDER can *now* be used in cases where cost has prohibited use of chromates in the past. For instance, electrical conduit, conduit boxes, screws and builder's hardware, tools, electronic parts, air conditioning parts, automotive parts, cheap toys.

LUSTER-ON 52 POWDER is not only low, low in price, but eliminates expensive handling, space-consuming storage and carboy deposits.

Still available, of course — time-tested Luster-On liquid dips and coatings for all your needs.

Data Sheets and Prices on Request. Send in part for free processing.

West Coast: Crown Chem. & Engr. Los Angeles & San Francisco

Canadian Licensee: Alloycraft Ltd. Montreal

THE *Chemical* CORPORATION

58 Waltham Ave. • Springfield 9, Mass.

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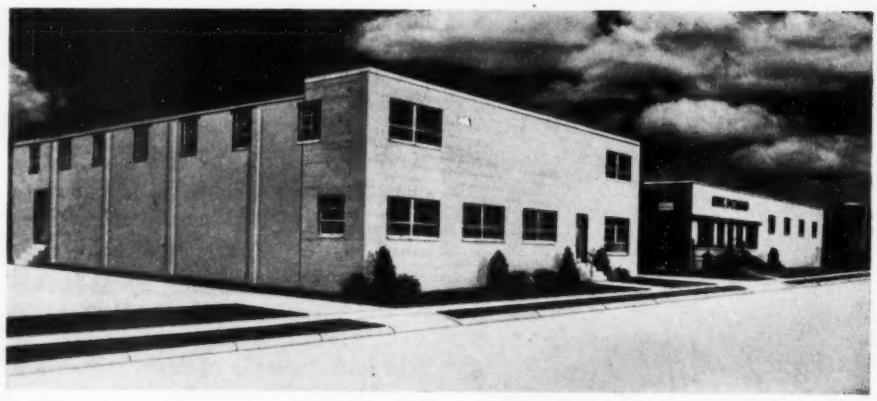
MacDermid, Inc., Expands



To enlarge product research and development facilities and to meet the steadily increasing demand for metal finishing chemicals and compounds, *MacDermid, Inc.*, Waterbury, Conn., recently expanded plant facilities in Ferndale, Mich.

Laboratory, office space and plant capacity have been doubled by the 9,000 sq. ft. addition costing more than $80,000. New production and materials handling equipment have been added to increase manufacturing facilities.

Clarkson Labs. Appoints O'Brien as General Sales Manager

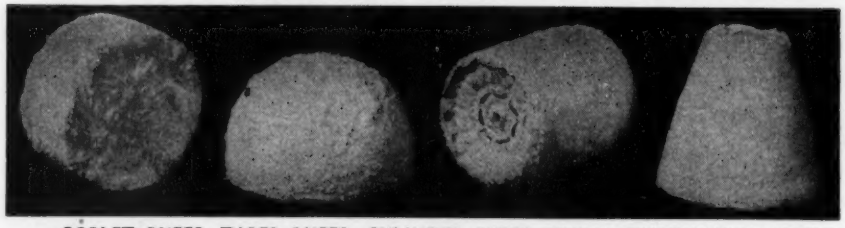
Clarkson Laboratories, Inc., of Philadelphia, announces the appointment of *Thomas F. O'Brien* as general sales manager of its *Metal Finishing Division*. Mr. O'Brien will have charge of expanding sales, on a nationwide basis, of the firm's line of materials and compounds for the metal finishing industry, and of introducing and promoting several new specialty items for the electroplating field.

Mr. O'Brien, who is widely known in the metallurgical and electrochemical industries, brings to his position ten years of varied plant experience plus a like period of sales and consulting work in the metal working field.

Delanium Graphite Company Appointed Distributor

Delanium Graphite Co. of Elizabeth, N. J., has been appointed exclusive distributors in North America for the original Delanium graphite block type heat exchanger manufactured by *Powell Duffryn Carbon Products Ltd.* of Hayes, England.

BUFFS FOR INSIDE POLISHING



GOBLET BUFFS, TAPER BUFFS, CYLINDER BUFFS, SMALL POLISHING WHEELS, RAZOR EDGE BUFFS, and many others for deburring, polishing and grinding any internal contour.

Write for additional information or contact your local dealer. These buffs are stocked by many dealers throughout the country.

We manufacture a COMPLETE LINE OF BUFFS including full disc loose and sewed buffs and polishing wheels. Our metal center BIAS TYPE BUFF may help cut your polishing costs.

Your request on your letterhead will bring our complete catalog by return mail.

BARKER BROTHERS INC.

ESTABLISHED 1911

1660 Summerfield Street Brooklyn 27, N. Y.

Canadian Distributor — LEA PRODUCTS COMPANY, Montreal

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Canadian H-VW-M Co., Ltd., Completes Expansion

The completion has been announced of a $140,000 expansion of the warehousing and manufacturing facilities at the Etobicoke plant of *Canadian Hanson & Van Winkle Co., Ltd.*, Canada's leading supplier to the metal finishing industry.

The new wing built at the Etobicoke plant will give the company an additional 16,000 square feet of warehousing and manufacturing space. It will allow the Toronto Plant at 15 Morrow Ave. to expand its office space and research facilities. The space for research will enable the company to expand its facilities for the development and testing of new processes and new materials for the metal finishing industries. More room will be available for customer service work which is an important part of the company's operations.

Friedman Elected President of Chromalloy Corp.

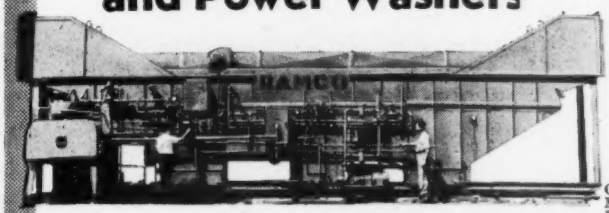
The board of directors of *Chromalloy Corp.*, White Plains, N. Y., announces the election of *Joseph Friedman* to the position of president. Until recently Mr. Friedman was executive vice-president of United States Hoffman Mach. Corp. and continues to be retained as a consultant by that firm. He has had extensive experience in management, sales and finance in the manufacturing industry. *Harry Harris*, former president of Chromalloy was named chairman of the board and *Richard P. Seelig*, executive vice-president and general manager, remains in charge of operations at the White Plains plant.

Alpha Plastics Names Long Vice-President — Sales

Thomas F. Long has been named vice-president in charge of sales at *Alpha Plastics, Inc.*, Okner Parkway, Livingston, N. J., a pioneer in the production of rigid, unplasticized polyvinyl chloride pipe and tubing.

RAMCO degreasers and Power Washers

ANOTHER RAMCO PRODUCT



LABORATORY DEGREASER

Courtesy Ford Motor Car Co., Detroit

Call our Engineering Department for the latest in:
ULTRASONIC CLEANING MACHINERY

Complete line of washers, tanks, ovens, and allied process equipment.

RAMCO EQUIPMENT CORP. Div. of Randall Mfg. Co., Inc.
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SOLVAY HYDROGEN PEROXIDE

Write for SOLVAY Hydrogen Peroxide 24-page fact book and chart of handling precautions. No cost!

SOLVAY PROCESS DIVISION
ALLIED CHEMICAL & DYE CORPORATION
61 Broadway, New York 6, N. Y.

BRANCH SALES OFFICES:
Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York
Philadelphia • Pittsburgh • St. Louis • Syracuse

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Recently Organized G. S. Plastics Co. Offers Specialized Services to Industry

Plastisols, epoxy, vinyl, Neoprene and other protective coatings and adhesives are the basic materials common to the many products and services provided by *The G. S. Plastics Co.*, new plant and offices at 15583 Brookpark Rd., Cleveland 11, Ohio. It is the newest member of the group of associated firms including The General Supply Co., The G. S. Equipment Co. and The Singleton Co., all serving the chemical processing, electroplating and manufacturing industries.

William A. Munkacsy is president. Associated with him is *Thomas R. Gill*, president of General Supply, G. S. Equipment, and vice-president of Singleton.

William A. Munkacsy

Thomas R. Gill

Munkacsy was formerly president of Munray Products and Poly-Cyclo Products of Cleveland, which he founded and then operated for 10 years with increasing success and growth before selling out to Fanner Mfg. recently. He was retained by the purchaser as president and general manager for the two divisions until he resigned, and subsequently organized The G. S. Plastics Co.

"Bill" Munkacsy is a member of the American Chemical Society, Cleveland Chapter of the National Paint and Varnish Clubs, and other professional and trade groups.

The new plant has complete, modern equipment for coating unusually large units. Featured are extensive laboratory and manufacturing facilities for custom formulating and production. The three major services for industry are (1) a custom service of applied coatings, (2) the manufacture of these coatings for resale in any quantity, and (3) the manufacture of completed and

McKeon's

Zinc-Brite

TRADE MARK REG'D.

Top-quality, low-cost

ZINC SOLUTION PURIFIER

Eliminates heavy metal impurities, including copper. Prevents harmful build-up of carbonates.

A complete cleansing treatment: — No other purification measures necessary.

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Sulphur Products Co. Inc.

228 McKeon Way

Greensburg, Pa.

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For ALL Your Metal Finishing Needs Depend on DAVIES

The Southwest's Leading Supplier of Industrial Plating and Polishing

- COATINGS
- CHEMICALS
- PLATING RACKS
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813 W. 17th St. • BAltimore 1-2128 • Kansas City 8

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coated equipment. These coating compounds, popularly used as inner linings and outer coatings for tanks, ducts, plating racks, material handling equipment, rolls, baskets, chutes, hangers, conveyor parts, etc., are being further developed by the firm to provide new products and applications.

Neilson Appoints New Representatives

Neilson Chemical Co. announces the appointment of *John W. Decker* as sales and service representative for the eastern Pennsylvania and eastern New York territory, and including New Jersey, Maryland and Delaware.

Mr. Decker is a graduate of the Michigan College of Mines and Technology and Wayne University, receiving his Bachelor of Arts degree in chemistry in 1948. His background includes seven years training in the metal treating and metal conditioning field, four years as development and service manager for the Neilson company, and three years as a manufacturing research engineer for the Pontiac Division of the General Motors Corp.

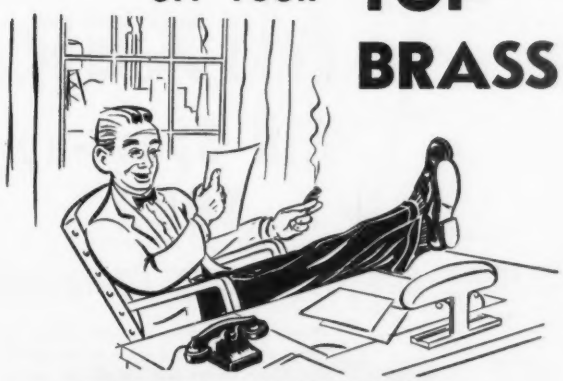
Willis J. Stoddard will be the sales and service representative in the Detroit and Michigan territory. He heads up the recently instituted alkali sales division of the company. He is a graduate of the University of Detroit and Wayne University, majoring in chemical engineering. Mr. Stoddard brings to the company twenty-seven years of experience in the field of metal treating and conditioning.

James W. Erwin will take over as sales and service representative for the western Pennsylvania and southwestern New York territory. Mr. Erwin's background includes chemistry and surface coating courses at the Detroit Institute of Technology and Wayne

John W. Decker

Willis J. Stoddard

TAKE THE **LOAD** OFF YOUR **TOP BRASS**



USE **TRUE BRITE BRASS SOLUTIONS**

Trouble Free — Low Cost
Little Supervision Needed
Ready To Use — Just Add Water
Uniform Color — Can Match Colors

Write For Bulletin on Brass Plating

TRUE BRITE CHEMICAL PRODUCTS CO.
BOX 31, OAKVILLE, CONN.

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FILTRATION UNDER DIFFICULT CONDITIONS

acid copper sulphate bright nickel

fluoborates precious metals

electroless nickel and other critical solutions

write for FOLDER

Sethco FILTER PUMP UNITS

Model LSIN series full view Lucite Filter chamber self-priming SS-316 pump Cap. 50-350 Gal. per hr.

over 25 models designed to fit your needs from 50-3,000 Gal. per hr.

Self-Priming. Automatic Back-Washing

Models equipped with corrosive resistant alloys and materials for every electroplating and industrial solution from pH 0 to pH 14. Also available: all plastic filter pump with no metal contacts. Removes particles down to one micron in size.

Sethco Mfg. Co., 74 Willoughby St., Bklyn., N. Y. • ULster 5-8940

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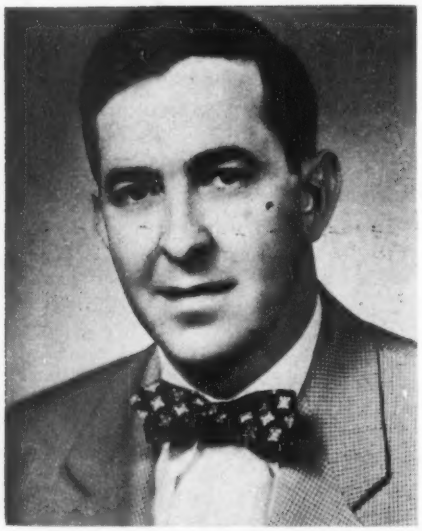


James W. Erwin

University. Since June, 1951, he has been connected in the technical end of the phosphate coating field; his previous experience being in the capacity of service manager until his recent appointment as a field representative.

Fischer & Porter Opens Indianapolis Office

Fischer & Porter Co. announces the opening of a sales office in Indianapolis, Ind. The new office will cover all territory in Indiana except counties in the northwest, which will be serviced from Chicago, and counties along the southern border, which will be serviced from Cincinnati.

William Morgan, who formerly headed the Milwaukee office, will be Indianapolis district manager. The address of the new office is 3025 N. Illinois St., Indianapolis 8, Ind. Phone: WAlnut 5-4626.

Swanton-Sailor Join Wyandotte Chemicals Sales Staff

Robert R. Swanton and *Ted A. Sailor* recently joined the Industrial Department of *Wyandotte Chemicals Corp.* Mr. Swanton will headquarter in the Detroit office; Mr. Sailor in the company's Chicago district.

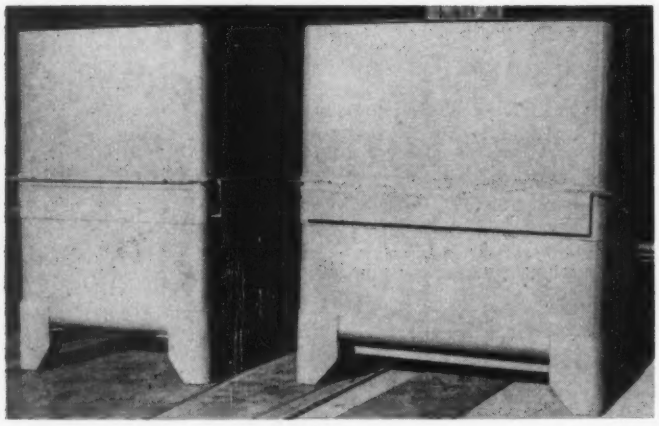
Mr. Swanton's father and his four brothers are all engaged in the electroplating or metal polishing industry. He has had 13 years experience in the electroplating field. Mr. Swanton operated his own plating company for three

Robert R. Swanton

years, served the U. S. Navy for three, and was employed by a plating company for five. For the past five years, he has been resident inspector for the Cincinnati Ordnance District.

Mr. Sailor began his metal finishing career in 1933 with a Chicago plating company where he remained 14 years including four and a half years in the

Welded according to plan.



Your special storage and processing units turn out to be just what you expect—the right lines—rugged, durable construction—efficient operation—when you call on STORTS to do the fabricating and the welding. You get everything in your order, plus the benefit of many years of experience in weld fabrication to specification.

STORTS WELDING COMPANY INCORPORATED

38 Stone Street
MERIDEN, CONN.

Manufacturers of Welded Fabrications to Specification

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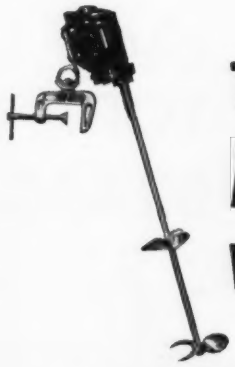
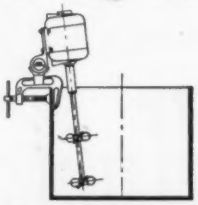


This Portable MIXER Will Speed-up YOUR Cleaning and Degreasing Operations



Mount Alsop Mixers to any tank or container —for any fluid mixing operations in your plant.

Here's a speedier, low-cost way to clean and degrease your work parts. An Alsop Mixer will do all the work —it will drive and dash the solvent through and around the parts—cleans them faster, and far more efficiently.

Sturdy, dependable Mixers for any size or shape, new or existing Tanks; for single or multiple installations. Alsop Portable Mixers are easily and quickly mounted. Sizes 1/4 to 7-1/2 H.P

Write Today For ALSOP Mixer Catalogue

ALSOP ENGINEERING CORPORATION
1202 Bright St., Mildale, Connecticut

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Ted A. Sailor

U. S. Army. He then joined the metal finishing department of Sunbeam Corp. For the past seven years, he has been a technical sales representative in Illinois and Indiana, servicing users of metal cleaning materials.

Both Messrs. Swanton and Sailor recently reviewed recent metal cleaning processes at the firm's chemicals industrial research laboratories.

Additional Space Acquired by Octagon Process, Inc.

Octagon Process, Inc., Staten Island, N. Y., announces the acquisition of 21,000 sq. ft. of additional manufacturing and storage facilities in buildings adjacent to their plant. These additional facilities will be used to expand their industrial cleaning and protective chemical production to assure continued prompt service and delivery.

This is the third plant expansion made in the last six years to meet the increased volume of their industrial chemical sales.

Cowles Appoints Swift, Changes Department Name

William R. Swift, an industrial engineer with extensive experience in metal cleaning, finishing, and lubrication, is now general field service representative for *Cowles Chemical Co.*, Cleveland, Ohio. Coincident with this appointment came an announcement that the name has been changed from Metal Cleaner Dept. to Metal Finishing Chemicals Dept.

William R. Swift

Swift is an industrial engineering graduate of General Motors Institute. He will provide liaison between the firm's research and service laboratories in Skaneateles Falls, N. Y. and the technical men regularly contacting the metal finishing trades. His duties are expected to include service on established brands as well as field development work on new products.

Swift, a native of Detroit, has moved

BEAM-KNODEL CO.

Metropolitan Distributors

HANSON-VAN WINKLE-MUNNING CO.

Complete Service for Metal Finishing

Products Listed Below Available in New York Stock With Reasonable Exceptions

GENERATORS

Anodes, All Kinds	Tallow	Nickel Salts
Brushes	Rouge	Copper Salts
Buffs	Emery Paste	Cyanide
Chemicals	Cleaners	Tanks, All Kinds
Tripoli Comp.	Emery	Plating Barrels
Acme White Finish	Glue	Polishing Wheels
		Polishing Lathes

195 LAFAYETTE ST., COR. BROOME

Phone CAnal 6-3956-7 NEW YORK 12, N. Y.

FILTERS

MAIZO Drying Materials

LEA Buffing & Polishing PRODUCTS

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HOW TO REDUCE PIPE COIL COSTS

Old-style pipe coils are obsolete. They are too costly. Ask for Bulletin 355 and learn all about the modern

DEAN THERMO-PANEL COIL

If you are now using old-style coils on important work you will discard them and you will install Dean Thermo-Panel Coil. It usually pays well to make the switch. Finishing, plating, cleaning executives, etc., who have made a careful study and comparison, are now specifying DEAN.

For example, at the left we show

a Dean Thermo-Panel Coil in a plating tank. It is NOT a coil. It TAKES THE PLACE of pipe coils. Costs less. Weighs less. Requires less space. More efficient. More economical. Much better in every way.

WHICH DO YOU WANT?

Check the squares below. Clip out. Mail to us with your name, firm name, and address. If you have a steam heating or cooling coil problem our bulletins will tell you how to solve it. If desired our specialists will help.

☐ Bulletin 257 — Design and Price Information.
☐ Bulletin 355 — 52 pages of Technical Data.

BACKED BY 20 YEARS OF PANEL COIL MANUFACTURING.

DEAN THERMO-PANEL COIL DIVISION

DEAN PRODUCTS, INC. 613 Franklin Ave. BROOKLYN 38, N. Y.

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to Cleveland and will make his headquarters at the company's general offices, 7016 Euclid Ave.

Rosen Named Technical Director at Kaye-Tex

The appointment of *Martin Rosen* to the post of technical director has been announced by *Kaye-Tex Mfg. Corp.*, Yardville, N. J., producers of plastic sheeting. Mr. Rosen joined the company in 1952 as a chemist. He also held the position of chief chemist and has been a member of the technical sales staff.

Mr. Rosen will also be responsible for the direction of technical activities of the company's wholly-owned subsidiary, *Kaykor Industries, Inc.*, manufacturers of vinyl and other structural and lining materials for corrosion-resistant construction.

Parker Promotes Thompson

E. B. Thompson, assistant sales manager of *Parker Rust Proof Co.*, Detroit, Mich., has been promoted to the post of general sales manager.

E. B. Thompson

Mr. Thompson joined the company 19 years ago when he graduated from the University of Michigan, and was assigned to the New York office sales-service staff. He was later promoted to Western Region and Chicago Office manager, which post he held for 8 years before his transfer to Detroit as assistant sales manager.

Sales Changes Announced by Raybestos-Manhattan

An extensive reorganization of the field sales structure of the *Manhattan Rubber and Packing Division* has been announced by *Raybestos-Manhattan, Inc.*, Passaic, N. J.

The new regional managers and their respective district managers are as follows:

R. F. Teeling, Eastern regional manager, with *Stewart Monroe* as New York district manager, *J. T. M. Frey*, New Jersey district manager, and *F. McBrearity*, Philadelphia district manager.

A. L. Hawk, Central regional manager, with *A. N. Johnston, Jr.* as Pittsburgh district manager, *G. S. Himebaugh*, Chicago district manager, and *E. T. Fair*, Denver district manager.

C. P. Shook, Jr., Southern regional manager, with *A. A. Ringland* as Birmingham district manager, *A. E. Jackson*, New Orleans district manager, *E. W. Nagel*, Dallas district manager, and *R. C. Nielson*, Houston district manager.

S. V. V. Hoffman, Western regional

Producers

NICKEL ANODES

Cast and Rolled

All Lengths

Prompt Delivery

SABIN METAL CORPORATION

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HARRISON & COMPANY, INC.

since 4A 1923

Specialists in

BUFFING COMPOUNDS

CAKE – BAR SPRAY – DIP

CEMENTS

for

ROLLS – WHEELS – BELTS

BOX 457

HAVERHILL, MASSACHUSETTS

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manager, with *R. B. Park* as San Francisco district manager.

Stine Elected President of Pangborn Corp.

Victor F. Stine has been elected by the stockholders, as of January 1, 1957, to serve as the new president of *Pangborn Corp.*, Hagerstown, Md., manufacturers of blast cleaning and dust control equipment. Concurrent with Mr. Stine's appointment, *Ralph M. Trent* assumes the duties of a director and executive vice-president and *W. O. Vedder* was elected a vice-president. *Thomas W. Pangborn*, founder and president of the corporation since 1904, will continue to serve as chairman of the board of directors, while *John C. Pangborn*, former 1st vice-president, will fill the office of vice-chairman of the board.

Mr. Stine, with the company for 45 years, started as a bookkeeper, progressed through diversified activities and, in 1935, became 2nd vice-president and sales manager. In 1941 he became vice-president in charge of sales and engineering and, since 1951, has been a director of the corporation.

Victor F. Stine

Mr. Trent, with the corporation for 27 years, has served as district sales manager in Pittsburgh and, since 1947, has been manager of the firm's Pacific Coast field organization. Trent will now be located in Hagerstown as a director and executive vice-president.

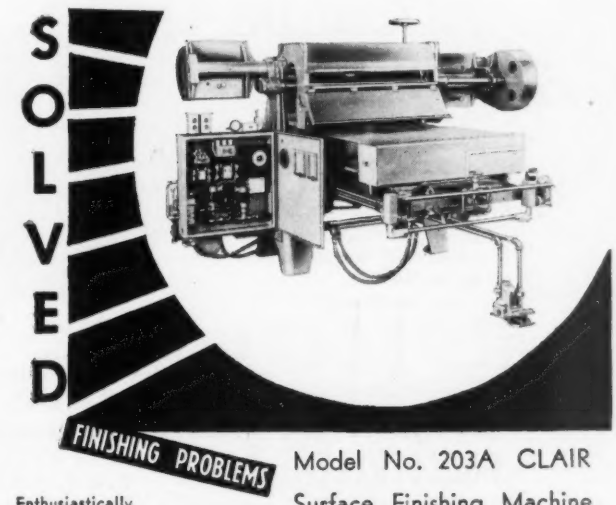
Associated with the company for 28 years, Mr. Vedder will continue to be in charge of the dust control division with his new position as a vice-president.

Hayden Named Assistant to President of Stanley

E. McKendree Hayden has been appointed special assistant to *William H. Baldwin*, president of *The Stanley Chemical Co.*, a subsidiary of The Stanley Works, located in East Berlin, Conn. Named to succeed Mr. Hayden as technical director of the company is *Robert F. McTague*, who has been assistant technical director.

In this new post, Mr. Hayden, who remains a vice-president and director of the concern, will be responsible for the development of new products, especially in the fields related to plastics. He has been one of the pioneers in the development of plastisols and organisols and has directed the technical program of the company for the past 20 years.

A native of Colorado, he was graduated from Hotchkiss School and Yale



Enthusiastically accepted for such application as:
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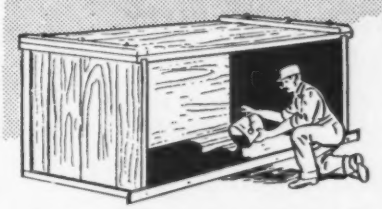

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University in 1914 with a B.A. degree. He also received a B.S. degree from the Massachusetts Institute of Technology. He was first employed as divisional superintendent of Merck & Co. and later was a chemical engineer for the U. S. Bureau of Mines. In 1917, during World War I, he was appointed commanding officer of the Kingsport Branch, Edgewood Arsenal, Tenn.

Mr. Hayden joined the company as a chemical engineer in January, 1919. He subsequently became works manager and technical director and was elected vice-president, a director and secretary of the company on November 23, 1936.

He is a member of the American Chemical Society, American Society of Testing Materials, New York Paint and Varnish Production Club, Alpha Chi Sigma chemical society and Sigma Xi engineering society. He is a fellow of the American Institute of Chemists. He belongs to the Yale Club of New York City.

Mr. McTague joined the company as a chemist in 1940 and became research director in 1946. He was named assistant technical director in 1956.

He rose from private to first lieutenant in the U. S. Army Chemical Corp. during World War II and from 1944 to 1946 he was on a government research team. After his discharge he remained as chief chemist with the U. S. government Rubber Reserve Corp. at Akron, Ohio.

A native of Worcester, Mass., he was graduated from Holy Cross College in 1939 and a year later, received an M.S. degree in chemistry there. He has completed post graduate work at the University of Akron and Case Institute of Technology. He is a member of the American Chemical Society and the American Association for the Advancement of Science.

Hagan Corp. Changes Name

Hagan Corp. changed its name to *Hagan Chemicals & Controls, Inc.*, effective January 1, 1957. At the same time its subsidiaries, *Calgon, Inc.*, *Hall Laboratories, Inc.* and *The Buromin Co.* will be merged into the parent company. Calgon and Hall will continue as divisions.

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Newark Branch

The Newark Branch Annual Educational Program was held on December 14, 1956 with sixty-five members present in spite of the rain and cold.

President *C. Struyk* accepted the resignation of *Dodd Carr* as chairman of the Newark Electroplating School Committee, expressing the gratitude of the Branch for a job well done and best wishes for a similar national activity Dr. Carr will head up.

An application for membership was reecived and *P. Peter Kovatis* was welcomed into the Branch as a transfer from member-at-large. Seven new members were elected to membership as follows: *Jim Lind* of Weston Electric, *Floyd Poling* of Industrial Systems, *David Foxman* of Abby Record Mfg.

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Co., *Thomas Monte* of Breeze Corp., *Francis Wecht* of Becton, Dickinson and Co., *Robert Steers* of Central Electronics Mfg. Co., and *Frank Koble* of Koble Equip. and Tank Co., Inc.

William Grigat announced all was arranged for the Christmas Party and asked all holding reservations to be sure to attend. *George Wagner* stated an up-to-date financial report would be made after the Christmas Party bill was paid.

Dr. Carr then introduced the speakers of the evening—*W. K. Murray* of Enthone, Inc. and *E. L. Combs* of Diamond Alkali Co., who spoke on "Overcoming Problems in Electroplating" and "Decorative and Hard Chromium Plating"—both of whom presented interesting papers well received by the audience.

On Saturday night, December 15th, the annual Christmas Party was held at the Robert Treat Hotel with a little under 300 present. A limited poll after the party showed this to have been one of the best parties Newark has had in years.

D. Gardner Foulke

Indianapolis Branch

The Indianapolis regular meeting was held on December 5, at Fox's Steak House with 37 regular members and guests present. *Dave Sivertsen* reported that the "paper committee" was proceeding with the topic the branch approved. *Fritz Anderson* advised a Tri-State committee meeting had arranged for the printing of tickets and that a movie had been planned for the March 30 meeting. He also advised that some of the St. Joseph Valley members were interested in becoming a part of Tri-State.

Harry Smith made a motion that delegates of the Indianapolis Branch proceed to invite the St. Joseph Valley Branch for further negotiations to enter Tri-State. *Les Reynolds* made a motion that *John Hood* be sent as the official delegate to attend the interim meeting January 11, 1957 at Pittsburgh.

Loren Stevens introduced *J. G. Seiter*, guest speaker who represented the F. J. Stokes Co. Mr. Seiter gave a very good picture of the new growing industry of vacuum metallizing.

Many questions were answered and all present realized that Mr. Seiter had given a very good idea of what to expect from the vacuum metallizing field.

The meeting was adjourned at 9:30 P.M.

Paul Freeman
Secretary

Central Michigan Branch

The Central Michigan Branch held its last meeting of 1956 on December 11, at the Porter Hotel in Lansing.

The speaker for the evening was *Ralph Pettit*, technical advisor to the Metal Industries Department of the Diversey Corp., whose subject was Aluminum Finishing. The talk and color film stressed the very latest processes for finishing aluminum, and was of interest to everyone. A social hour followed the program.

Earl D. Creese
Publicity Secretary

Pittsburgh Branch

After dinner, which was attended by eighteen members and guests, the regular December monthly meeting of the Pittsburgh Branch was opened by

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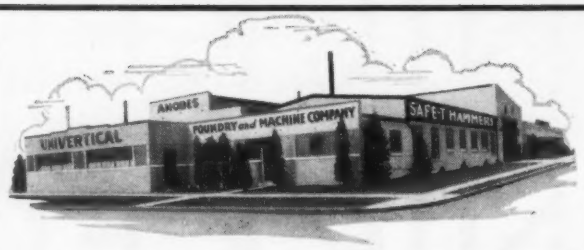

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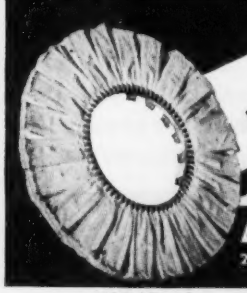

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M. Ceresa, president. The branch voted to membership in the Society *Bruce W. Wilson* of Pennsalt Mfg. Co. and *Guy M. Lester* of We-Sa Mfg. Co. Both new members were present and introduced to the group. One application for membership was also read, having been approved by the board of managers. The new applicant is *John C. Fugazzi.* He will be voted on at the next meeting January 11.

W. S. McCormick reviewed his report of the October meeting on the Ladies Auxiliary and their meeting with the Branch for dinner in February. A motion was made to accept the committee's recommendations unanimously. President Ceresa expressed his wish that all possible attend the Interim Meeting next month and also the branch meeting which has been changed from its usual time to Friday, January 11.

Librarian *R. Woehrle* introduced the speaker for the evening. *C. J. Owens* of Mellon Institute. Mr. Owens discussed "Impurities—Their Effect on Nickel Plating" as studied under Project No. 5 of the A.E.S.

Following a break for refreshments, the door prize drawing was held. *Ed Keller* was the winner and *J. Kessler* of Van Straaten Chemicals was the donor.

A short discussion of the subject closed the meeting.

Fred Stevens
Secretary

Chicago Branch

After an interesting business meeting and a delicious dinner on Friday, Dec. 14, we were priviledged to hear two speakers. In accordance with the two for one policy this year, *Christopher Marzano,* a member of the Chicago Branch for many years, gave an interesting talk on electrodeposits of uranium from a fused salt bath. Chris did this work while doing research at Argonne National Labs. He is presently connected with Amphenol Electronics Corp.

The main speaker of the evening was *John Juner,* president of Electro-Glo Co. John is a graduate chemist and has done a lot of the original work in the developing of solutions for both the electro-coloring of metals as well as in the field of chemical coloring of base metals. This background plus his additional experiences in operating a job-shop and selling chemicals to the trade well qualifies him to speak on the subject of electropolishing. John gave a very interesting historical resume of the process including the chemical composition of many of the earlier solutions. After a detailed description of present day methods, equipment, and solutions the speaker operated a small unit which was set up on the speakers platform. Samples of finished parts were distributed among the members present. The meeting was adjourned after a rising vote of thanks for the speakers.

J. C. Corre
Publicity Chairman

Capitol District Branch

The third annual Christmas party of the Capitol District Branch was a huge success. It was held December 8th at the Willowbrook Inn, Scotia, N. Y.

The steak dinner was delicious. Pete Emma's Orchestra enlivened the remainder of the evening with excellent

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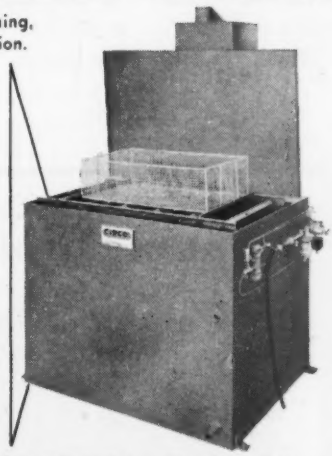

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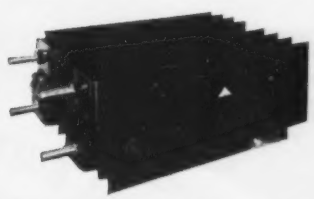

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dance music and provided comic skits with audience participation.

The branch is especially appreciative of the efforts of *Ed Frieberg*, committee chairman as well as his committee, *Tom Barile* and *William Nelson* and President *Jack O'Connor*.

E. V. Raymond
Secretary

Dayton Branch

The Dayton, Ohio Branch will hold its Eleventh Annual Educational Session and Dinner Dance on Saturday, March 9, 1957 at the Hotel Biltmore, Dayton, Ohio.

Three outstanding papers will be given at the Educational Session starting at 1:30 P.M. It is hoped that President *Samuel Heiman* will be able to attend and be the honorary chairman. The speakers and their topics are:

C. E. Kimmel, Dow Chemical Co.; "Finishing Magnesium."

Kenneth Huston, Armco Steel Corp.; "Surface Preparation of Stainless Steel."

Myron Diggin, Hanson-Van Winkle-Munning Co.; "Latest Developments in Nickel Plating."

The Dinner Dance in the main ballroom will start at 6:30 P.M. Tickets are available at $6.50 per plate from Ticket Chairman, *Bennie Cohen*, 1256 Wilson Dr., Dayton 7, Ohio.

Los Angeles Branch

Executives of 14 of the 21 firms who hold sustaining memberships in Los Angeles Branch were honored at a special Sustaining Membership Program which featured the branch's opening meeting of 1957 on January 9 at Rodger Young Cafe, Los Angeles.

Officers and representatives of sustaining members were grouped at a separate table and each was individually introduced by *Kenneth C. Johnson*, chairman of the research committee.

Representatives of sustaining firms present at the meeting were the following: *Robert Coombs*, Crown City Plating Co., Pasadena, *Stanley Kritzer*, North American Aviation, Inc., El Segundo; and the following from Los Angeles: *Harvey Hunt*, Alert Supply Co.; *George Peters* and *Stewart Krentel*, Kelite, Inc.; *Charles King*, Surface Alloys; *Edward Conferd*, Virtue Bros.; *Oscar Gast*, Modern Plating Co.; *Roger Sundmark*, Sundmark Supply Co.; *Paul Franks*, Price-Pfister Co.; *Don Bedwell*, Hall-Mak Co.; *Tony Stabile*, Associated Plating; *John Millhorn*, Millhorn Chemical & Supply Co.; *Ben Tarver*, L. H. Butcher Co.; and *George Hetz*, Mefford Chemical Co.

Unable to send representatives to the meeting were six other sustaining members: Barber-Webb Co., Nichols Plating Co., Rheem Automotive Manufacturing Co., Standard Nickel & Chrome Co., Turco Products, and Wildberg Bros.

Johnson explained how the A.E.S. research program was established at the National Bureau of Standards at Washington in 1927 with *Dr. William Blum* conducting the early experiments, which were financed with funds contributed by A.E.S. members and firms interested in the progress of metal finishing sciences.

Emmett Babcock took the story from there and related the progress of A.E.S. research to its present status. He outlined the various important projects now underway and others which will be launched by the national society as soon as a capable project director can be determined upon.

Approximately 75 members and guests were present at the January meeting. Seven new members, all of whom were present for the initiation ceremony, were inducted by President Stoner. The new members are *D. W. Beeson*, *Nathan Robinson*, *Vern Hinderer*, *Peter LaBarbara*, *R. J. Swisher*, *Downey Morgan* and *Jerome Weaver*. Applications were received from *James Pelham*, *C. J. Bockman*, *Russel Davis*, *Norman J. Fell*, *Willard Arkel*, *E. Barker*, *Robert L. Cooms*, and *Charles King*.

President Stoner appointed a three-man nomination committee to recommend a slate of branch officers for 1957. Serving on the committee are *Stuart Krentel* (chairman), *Ed Wells* and *Earl Arnold*. The election will be held at the March 13 meeting.

In rounding out his committee assignments for the 1960 A.E.S. convention in Los Angeles, Co-general chairman *George Hetz* announced that *Larry M. Henderson* had been named chairman of the hotel committee. *Harvey Hunt*, general chairman for the branch's 1957 educational session (March 23), held a meeting of all his committee chairman on January 14 to iron out final plans for that affair.

Platers of the Los Angeles area have in prospect a real treat on the night of February 13 when charter members of the branch will be honored. The night has been designated as Charter Members Night. *Earl Coffin*, himself a

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founder of the branch, as chairman of the evening, announced that an effort will be made to persuade every charter member still residing in California to attend. He estimated there were some 8 or 9 old-timers still on the West Coast. His committee assistants are *Phillip Simon*, *Ed Wells* and *George Magurean*.

The part of the program which is expected to appeal to old and new members alike, Coffin declared, will be the talks by various of the old-timers on shop techniques, plating and polishing methods of 35 and 40 years ago, as compared with modern methods in use today. Some of the charter members have careers dating back to before World War I, when platers tested the pH of solutions by sticking in their finger, Coffin, said, and will relate many more out-moded practices of those days.

Men like Coffin, *Don Bedwell*, *Clarence Thornton* and *Ray Vasquez*, whose careers span the gap between pre-World War I and post-World War II, will discuss plating methods from the crude and unscientific days of 1915 to the electronically controlled automatic plating techniques of 1957.

December Ladies Night

The distaff side turned out to the number of close to 50 on the night of December 14 which had been designated as the annual Ladies Night. The chief purpose, as announced by President *E. Truman Stoner*, was to permit the branch ladies to become better acquainted, since they will be called upon to serve on various ladies committees when the Supreme Society convention is held in Los Angeles in 1960.

Following dinner in the main ballroom of the Rodger Young Cafe, a fashion show was presented by models of the Mari-Lyn Dress Shop of Los Angeles. Stoner introduced the fashion commentator, *Mrs. Louise Thompson* who, in turn, presented a sextet of beautiful models who paraded before the A.E.S. ladies with the latest creations in sports, home, dinner and dance dresses, coats, hats and accessories. The only complaint from the male contingent developed when it was definitely determined that no bathing suit models would be displayed.

New York Branch

The New York Branch will hold its Annual Educational Session and Banquet at the Hotel Statler, New York City, on Saturday, March 2, 1957.

The technical session will be held at 2:30 P.M. The speakers will be: *Cleve Nixon*, head of Electrochemistry Div., General Motors Research Labs., Detroit, Mich., "Conservation of Nickel in the Plating Room"; *Leonard Chesworth*, Chief Chemist, United Carr Fastener Corp., Cambridge, Mass., "Modern Trends in Barrel Plating"; *Dr. Henry Brown*, head of Research, Udylite Corp., Detroit Mich., "Surface-Active Agents in Plating."

The Chemical Institute of Canada

The 11th Divisional Conference of the Protective Coatings Division of The Chemical Institute of Canada will be held in Toronto, February 21, 1957, at the Seaway Hotel, and in Montreal, February 22, 1957, at the Ritz Carlton Hotel. The same program is scheduled for both cities. This continues the successful two-city meetings that this Division inaugurated in 1953.

The speakers will include: *W. M. Kraft*, Heyden Chemical Corp., "Considerations in the Processing and Uses of Pentaerythritol Alkyds"; *J. K. Hossack*, Ferro Enamels (Canada) Ltd., Oakville, "New Developments in Inorganic Coatings"; *W. N. B. Armstrong*, assistant director, department of chemistry, Ontario Research Foundation and *J. W. Suggitt*, supervising chemist, research division, Hydro-Electric Power Commission of Ontario, "Coatings Evaluation and Laboratory Correlation with Field Experience"; *R. R. Hunter*, A. V. Roe Co., "Coatings for High Speed Aircraft"; and *W. B. Anderson*, Titanium Pigment Corp., New York, "The Properties and Uses of Some Organic Compounds of Titanium."

A. J. Lilly, manager of aircraft sales, Canadair Ltd., Montreal, is to be the luncheon speaker at both sessions. His subject is "Supersonic High Speed Test Flying," in which he will describe the experiences of a test pilot flying high speed aircraft.

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National Ass'n. of Metal Finishers

Harold W. Baker

Harold W. Baker, Electro Galvanizing Co., Chicago, Ill., has been named 1957 annual meeting chairman of the N.A.M.F. According to an announcement by N.A.M.F. President *John Palik, Jr.*, Baker will be in charge of annual meeting activities which include a management seminar, meetings of the membership and board of directors, and traditional banquet.

No newcomer to the plating industry, Baker is chairman of the N.A.M.F. affiliate, the Chicago Electro Platers Institute and is an active member of the N.A.M.F. board of directors.

The National Association of Metal Finishers will hold its annual convention at the Mount Royal Hotel, Montreal, Canada, June 16 and 17, 1957 concurrently with the 44th annual meeting of the American Electroplaters' Society.

National Technical Task Committee on Industrial Wastes

Fifty scientists representing all major industries in the United States, and representatives of the United States Public Health Service, convened at Mellon Institute December 13 and 14, 1956, for the annual meeting of the National Technical Task Committee on Industrial Wastes. *Prof. C. Fred Gurnham*, head of the Department of Chemical Engineering of Michigan State University, presided. Prof. Gurnham and *Dr. D. G. Foulke* of Hanson-Van Winkle-Munning Co., who also was present, are the official delegates from the A.E.S.

This committee is a voluntary group formed to work with the Public Health Service of the United States Department of Health, Education, and Welfare, to protect the nation's water resources from pollution and contamination. Its members actively engage in research and development work on the utilization, treatment, and control of industrial wastes, and improvement of water quality controls. Emphasis is placed upon the fact that an effective national program can only be developed by means of education of public health authorities, major branches of industry, and the technical and professional societies of the country.

Dr. Thomas Parran, dean of the Graduate School of Public Health of the University of Pittsburgh and former Surgeon General of the United States, addressed the task group at its annual dinner, on the subject: What Goes on in a School of Public Health.

Frank J. McKee of the Kraft Food Co., Chicago, Ill., was elected chairman of the Task Group and *Richard D. Hoak* of Mellon Institute was elected vice-chairman.

The Electrochemical Society, Inc.

The 111th Meeting of The Electrochemical Society will be held at the Hotel Statler, in Washington, D. C., Sunday through Thursday, May 12, 13, 14, 15, and 16, 1957. Technical Sessions will be conducted by the Electric Insulation, Electrothermics, Industrial Electrolytic, and Theoretical Division of the Society.

NEW BOOKS

ASTM Standards on Zinc-Coated Iron and Steel Products

Published by American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 1956. Price: $2.25. 134 pages. Paper cover.

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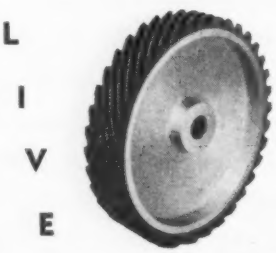

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ient form for reference the various ASTM standards and tentative methods for test and specifications. Sponsored by Committee A-5 on Corrosion of Iron and Steel, the volume includes 21 specifications, of which four are new or recently revised; three recommended practices, two of which are new; and five methods of tests. Among materials covered are wire, strands, fencing, sheets, hardware, terne-alloy coated sheets and miscellaneous products.

Electrochemistry-Principles and Applications

By E. C. Potter. Published by The MacMillan Co., 60 Fifth Ave., New York 11, N. Y. 1956. Price: $10.00. 410 pages plus index.

Since this text and reference book has been written in a form sufficiently simple for the student without more than a moderate knowledge of mathematics and chemistry, it can be highly recommended to those platers who wish to advance beyond the usual electroplating course stage. Modern views on electrochemistry are presented, together with an explanation of the principles involved in commercial applications, and numerous examples are included for clarification.

The sections on application of electrochemical principles to industrial processes may be considered sufficient only to illustrate these principles; they are not sufficiently detailed to serve any other purpose, especially as regards the metal finisher. The first and major part of the volume, however, on theoretical aspects, are of more than sufficient value to warrant addition to the plater's library.

Stress Corrosion Cracking and Embrittlement

Edited by William D. Robertson. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1956. Price: $7.50. 200 pages plus index.

The papers published in this volume were presented at a symposium arranged by the Corrosion Division of *The Electrochemical Society* in 1954. In the ten years which have elapsed since the previous symposium on this subject, our knowledge of the structure of metals and alloys has increased enormously and the fourteen papers represent the modern approach to the mechanism of stress corrosion cracking. Included, are 334 references for further study.

News from California

By Fred A. Herr

Gene Chapdelaine of Conversion Chemicals Corp., Rockfield, Conn., was a visitor to the Pacific Coast in mid-January. He spent several days in Southern California conferring with officers of Alert Supply Co. of Los Angeles, the New England firm's West Coast representative, and also called on the trade in the San Francisco and Pacific Northwest areas. Mr. Chapdelaine attended the January 9 meeting of Los

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Angeles A.E.S. Branch (he is a member of Hartford, Conn. Branch) with *Harvey Hunt* of Alert Supply Co.

Harry D. Bailey, a plating shop owner and plater in Southern California for more than 45 years, passed away of a heart attack on January 3 just a week after the death of his wife. He was 74 years old. Mr. Bailey had been associated with the Royal Plating Co. of Los Angeles since 1922. Prior to that he had operated his own shop for a number of years. In 1922 the Modern Plating Co., with which he was then connected, was acquired by *Frank Burns* and merged with the Royal shop. Los Angeles Branch of the A.E.S., which Mr. Bailey joined as a charter member in 1931, was represented at the funeral by *Don Bedwell*, superintendent of the Hall-Mak Company, Los Angeles, with whose brother Mr. Bailey had operated a job shop partnership in Los Angeles prior to World War I.

Los Angeles Branch, A.E.S., has concluded arrangement for the appearance of two of the outstanding figures in the American plating industry as speakers at its annual Educational Session which is to be held at the Los Angeles Ambassador Hotel on March 23.

Dr. Samuel Heiman of Philadelphia, national president of the Supreme Society, will address the session on modern plating practices and new methods of shop operation, plus a presentation of facts concerning the progress and functioning of the A.E.S. *Dr. Walter Meyer* of Enthone, Inc., New Haven, Conn., who served as editor of METAL FINISHING in the early 1940's when this publication was known as METAL INDUSTRY, will deliver a talk on "Electroplating Solutions in Action."

To round out the program, *Emmett Babcock*, chairman of the educational committee, has arranged for a talk by *Leo Missell*, process engineer of Lockheed Aircraft Corp., Burbank, Calif., on "Chrome Plating."

A mid-day luncheon featured by a Story Telling Contest, and a dinner dance in the evening, of which a waltz contest and distribution of several hundred door prizes will be the highlights, are also on the program.

The Permaluster Division of Allied Marketing & Research Co. in January moved from 1905 N. Central Ave., El Monte, to new offices and manufacturing quarters at 2012 Burbank Blvd., Burbank, Calif. The new plant is equipped for research and development of improved finishes on aluminum sheets, wire or strip for manufacturers and processors. The firm offers a special anodic process suitable for applications where extreme corrosion resistance, heat resistant color, or extreme brilliancy for decorative purposes is required. Equipment has also been installed for continuous strip and wire after the anodic coating has been applied.

Los Angeles City College, Evening Division, in cooperation with the Los Angeles Paint, Varnish & Lacquer Association and the Los Angeles Paint & Varnish Production Club, is offering three evening courses in paint technology during the Spring semester starting February 4.

The courses include:

Color and Decoration (Paint Tech. 14), held on Mondays from 7 to 8 p.m., with *Roy Fredericks* as instructor; Problems of the Paint Industry. Mondays from 8 to 9 p.m., with Fredericks also as instructor; and Color and Decoration Laboratory, Thursdays from 7 to 10 p.m. with *Fred L. Fox* as instructor.

A committee which served in setting up the program is composed of *C. E. Campbell* (chairman), National Lead Co.; *Knox Price*, Nuodex Products Co.; *W. W. Cadwallader*, A. J. Lynch Co.; and *Frank Witteman*, W. P. Fuller & Co.

Furane Plastics, Inc., Los Angeles, has announced the appointment of *J. C. de Graaf* as sales manager of its coatings division. He will have supervision of sales of Epocast protective coatings, Epibond adhesives, and Epocast pastes. Mr. de Graaf had been sales manager for the Fruit-O-Matic Co. of Van Nuys, Calif., for the past eight years.

Roy E. Klotz, vice-president in charge of sales of Anadite, Inc., South Gate, Calif., has announced appointment of *Don L. Abajian* as head of the firm's advertising and promotion department. Anadite is one of the leading metal finishing firms on the Pacific Coast. Abajian was formerly advertising manager for the Warren & Bailey Co., a Pacific Coast industrial supply firm.

Speakers and panels at the 10th

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Western Metal Congress, to be held March 25 to 29 at the Ambassador Hotel, Los Angeles, will pay particular attention to inhibition of corrosion in the chemical and petroleum industries.

An entire panel of the American Society for Metals session will be presented on corrosion and metal protection, with *Martin L. Michaud*, material supervisor of the Union Oil Co., of California, as chairman. The topics and speakers will include:

"Metallic Coatings for the Protection of Steel," by *C. H. Sample*, manager of the electroplating section, Inco Research & Development Division, New York; "Importance of Inspection in Corrosion Control" by *E. H. Tandy*, chief inspector, Standard Oil Co. of California, El Segundo, Calif.; "Non-Metallic Coatings in the Petroleum & Chemical Industry," by *Lester Morris*, president, Coating & Fiberglass Research Co., Los Angeles.

It has been announced that one entire session will be devoted to metals for semi-conductors. A titanium conference of 5 days duration is also on the program, and will be held at the Ambassador Hotel from March 25 to 29. Separate sessions of the Society of Non-Destructive Testing and the American Institute of Mining and Metallurgical Engineers have been scheduled.

The western sections or branches of 36 national technical societies, including Los Angeles Branch of the A.E.S. are cooperating with the ASM in presenting the Congress, and the Metal Exposition, which will be held in the Pan Pacific Auditorium in Los Angeles.

Dr. Bernard Planner, materials and process engineer for the Marquardt Aircraft Co. of Van Nuys, Calif., has been assigned as metallurgical consultant and observer for all of Europe for the Armour Research Foundation of the Illinois Institute of Technology, Chicago. He will have his headquarters at the Armour Research Foundation, in The Hague, Holland.

PATENTS

(*Continued from page 77*)

Rotary Blast Nozzle

U. S. Patent 2,755,598. *July* 24, 1956. *W. N. Van Denburgh.*

Blast cleaning apparatus comprising a housing provided with a longitudinal bore having blast particle inlet and outlet ends, a nozzle rotatably mounted in said housing bore, and means carried by said housing for rotating the nozzle, said nozzle being formed with an elongate cylindrical section axially aligned with and extending through said bore to a point near said outlet end, said cylindrical section having a smooth cylindrical inner peripheral wall bifurcated at said point into a plurality of independent branches, said branches cumulatively forming a continuation of substantially all of the cross-sectional area of said cylindrical portion and of at least a major part of its said inner peripheral wall, each of said branches continuously diverging in an outwardly-flared direction with respect to said bore axis and each opening to the exterior of said apparatus at said outlet end, whereby blast particles delivered to said rotating cylindrical section are subjected to centrifugal force and said centrifugal force is applied uninterruptedly until the particles are discharged from the apparatus.

Buffing Tool

U. S. Patent 2,755,608. *July* 24, 1956. *R. O. Peterson, assignor to The Osborn Mfg. Co.*

A rotary abrasive buff comprising a channelform back, a continuous elongated strip of flexible material secured within such channel, and flexible generally triangular folded sheet material fingers secured in pointed end regions to said strip, said fingers having abrasive regions intermediate their lines of folding only.

Aluminum Bright Dip

U. S. Patent 2,756,131. *July* 24, 1956 *H. Neunzig, assignor to Vereinigte Aluminum-Werke Aktiengesellschaft.*

A method for brightening the surface of articles made of aluminum and of aluminum alloys and particularly magnesium containing aluminum alloys comprising applying to said articles a hot aqueous solution containing per liter between 1.6 to 2.7 gram molecules of nitric acid, between 1.8 to 3.5 gram molecules of ammonium, 3.5 to 7.0 gram molecules of hydrofluoric acid, 2.5 times 10^{-5} to 2.5 times 10^{-4} gram molecules lead nitrate and 0.5 to 2 per cent of an inhibitor selected from a group consisting of gum arabic and dextrin.

Corrosion Prevention—Aluminum

U. S. Patent 2,756,162. *July* 24, 1956. *P. J. Garner and R. Graham, assignors to Shell Development Co.*

The process of protecting porous surfaces of aluminum clad corrodible metal articles, which comprises the steps of coating said surfaces with a solution of an aluminum alcoholate, evaporating the solvent from said coatings and hydrolyzing the alcoholate, whereby a substantially continuous coating of aluminum hydroxide is formed on the surfaces.

Vacuum Metallizing

U. S. Patent 2,756,165. *July* 24, 1956. *D. A. Lyon, assignor to the United States of America.*

A process for producing an electrically conducting coating on a surface of a solid inert insulating body which comprises the steps of exposing said surface to an atmosphere of copper vapor and then exposing the resulting copper coated surface to iodine vapor.

Vacuum Metallizing

U. S. Patent 2,756,166. *July* 24, 1956. *P. Alexander, A. S. Baxter and M. E. Boston, assignors to Continental Can Co., Inc.*

For use in an apparatus for depositing metal onto a surface and having an evacuated chamber surrounding the surface and an evaporating heater in said chamber for contact with the metal to be deposited, the invention which consists in having said heater composed of a carbon core and an outer coating layer of composite free metal and metal carbide upon said core, said layer being selected from the group consisting of titanium carbide containing free titanium metal and vanadium carbide containing free vanadium metal, said outer layer adjacent said carbon core being rich in the carbide and poor in the selected free metal and its exterior surface being rich in the selected free metal and poor in the corresponding carbide, said layer being characterized in that the molten metal to be deposited can wet and be spread by the selected free metal present at the surface of the said layer, and the layer is effective to prevent contact with the coated carbon core by the metal to be deposited.

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1500	30/50	Century
1500	40/65	G. E.
1500	65	Westinghouse
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1—5000/2500 Ampere, 9/18 Volt, Chandeysson, Synch., Exc.-in-head.
4—3000/1500 Ampere, 12/24 Volt, Chandeysson, Exciter-in-head.
1—2500/1250 Ampere, 9/18 Volt, Electric Products, Synch., Exc.-in-head. 25°C.
1—2000/1000 Ampere, 6/12 volt, Hanson-Van Winkle-Munning.
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1—Packermatic 60" Table with 12" centers & 7 polishing heads.
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21—Automatic Machine Co. Oscillating single spindle, semi-automatics, Lefts & Rights.
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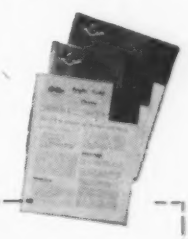

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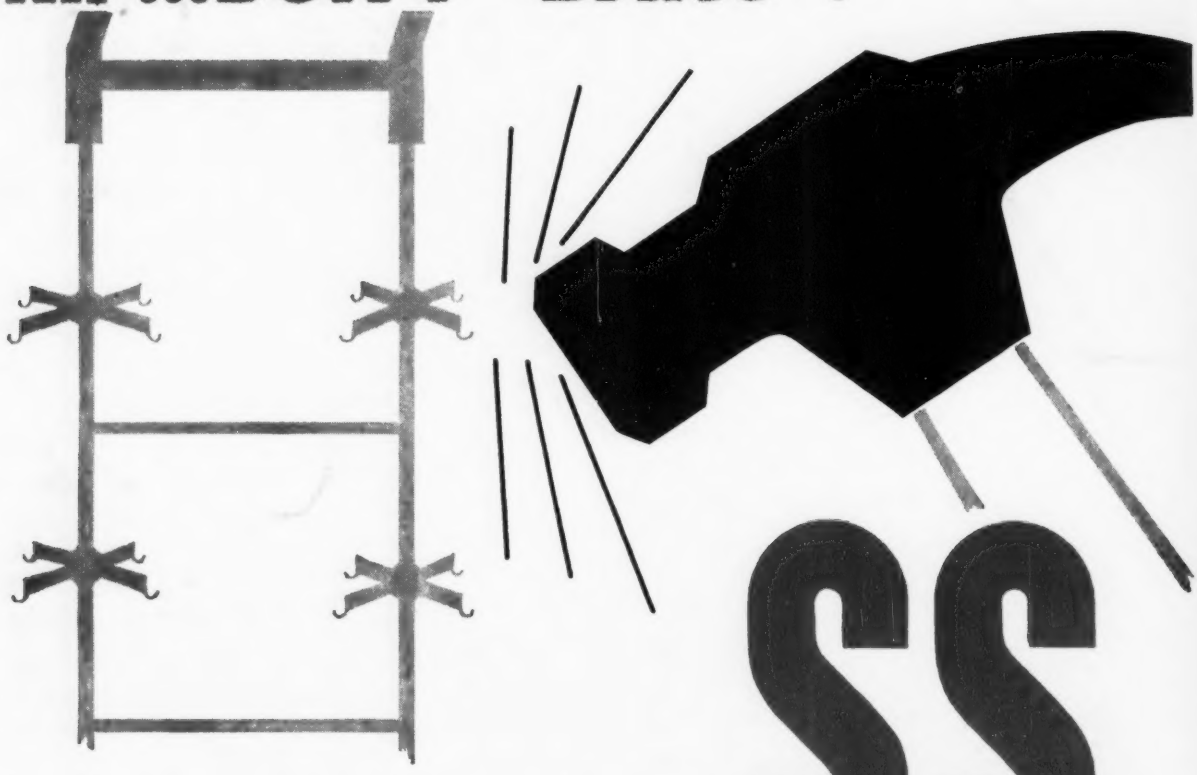

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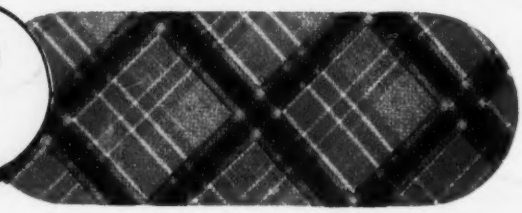

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